Seizing the Opportunity

Volume 1

Nova Scotia's Energy Strategy

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Province of Nova Scotia Members of Executive Council Inside Back Cover

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Cover:
Nova Scotia is in the early stages of building a world-class energy industry. The energy strategy outlines a plan for achieving this objective by striking the right balance between developing our renewable and non-renewable resources.
Cover Photo: *Wind energy courtesy of Vision Quest Windelectric Inc.*
Cover Photo: *Coal in Cape Breton courtesy of the Nova Scotia Petroleum Directorate*

Cover Photo: *Bluenose II and the Eirik Raude rig courtesy of Communications Nova Scotia*
A symbolic image of our past, present and future. The Bluenose II—a tribute to the shipbuilding industry in Nova Scotia—sails in Halifax Harbour past the Eirik Raude—a deepwater drilling rig undergoing completion work by Nova Scotia tradesman. The emergence of our offshore oil and gas industry marks a new era in the history of our province.

The Bluenose II Preservation Trust is a volunteer-led, not-for-profit organization and a registered charity with a mandate to maintain and operate the heritage schooner, Bluenose II, on behalf of her owner, the Province of Nova Scotia.

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This publication is available on the Internet at **www.gov.ns.ca/energystrategy**

Gordon Balser - Minister Responsible for the Petroleum Directorate

Ernest Fage - Minister of Natural Resources

PREFACE

We are pleased to submit to the Government of Nova Scotia *Seizing the Opportunity: Nova Scotia's Energy Strategy.*

The Department of Natural Resources and the Nova Scotia Petroleum Directorate were given responsibility to prepare a comprehensive energy strategy for Nova Scotians. Our report covers all forms of energy—from the rapidly growing offshore oil and natural gas sector to electricity and coal. It also commits the government to act upon a number of environmental considerations and energy impacts on our economy and our society.

The report is the result of a team effort. Our two organizations have worked closely together on this task. We have also consulted regularly with senior managers from 12 provincial departments and agencies and enjoyed co-operation from a number of federal government departments, including Natural Resources Canada, Fisheries and Oceans Canada, Environment Canada, and the Atlantic Canada Opportunities Agency (ACOA). Federal and provincial agencies and regulators have also had an opportunity to comment on our task and its direction.

This report is the tangible result of our work. However, its value goes far beyond the written pages. Nova Scotia's energy strategy is the result of an extensive and successful public consultation process. From the hundreds of Nova Scotians who attended the public workshops across the province to the more than 100 organizations and individuals that took time to meet and make written submissions, it has been a very positive experience.

We also were able to draw on the wide range of experience and expertise of close to 200 local and national industry leaders and interested Nova Scotians who took part in the Energy Forum. The forum was co-chaired by former Alberta premier Peter Lougheed and Nova Scotia's Sir Graham Day. We also ensured that this advice was widely shared by posting submissions on our energy strategy website www.gov.ns.ca/energystrategy. This site is and will continue to be an informative and valuable resource for anybody who wishes to learn more about energy in Nova Scotia.

We would like to thank all those who participated in the energy strategy process; without their thoughtful and constructive input, this strategy would not have been possible. We would also like to thank all the members of the energy strategy team who are responsible for the preparation of this report.

Respectfully submitted:

Gordon Balser

Gordon Balser
Minister Responsible for the
Nova Scotia Petroleum Directorate

Ernest L Fage

Ernest Fage
Minister of Natural Resources

STRATEGY OVERVIEW

Nova Scotia Premier John Hamm

Nova Scotia's past and future are deeply linked to the sea. For centuries our prosperity has largely depended upon how well we managed the ocean's bounty, built ships, and conducted trading around the world. This rich maritime history can be seen today in the historic buildings and streetscapes in communities throughout the province. It helped establish Nova Scotia as an equal founding partner of the Canadian nation.

Today, we stand at a crossroads with another form of wealth from our ocean. Canadian and global energy companies are spending billions of dollars searching for and developing the oil and gas under the seabeds off our coast. These activities should help us build a strong, diversified economy.

We have a clear plan to achieve this. First, we must encourage exploration. We need to find more oil and gas reserves if we are to create a world-class oil and gas industry and secure additional jobs and business growth in Nova Scotia. This will require government and industry to provide training and apprenticeship programs so that Nova Scotians gain the skills they need to participate in this growing industry.

Our government will take action to improve the working relationships and trust among the fishing industry, coastal communities, and the offshore petroleum industry. These measures will also help protect our marine environment.

The benefits from our expanding energy sector must be long term. We will secure the province's future by increasing renewable energy sources, expanding research and development, and using growth in the energy sector to expand our economy. We will vigorously pursue the maximum economic value of our offshore resources by fully participating in the regulatory approval processes.

Our government's new energy strategy balances our social obligations with a firm commitment to improve the environment, while fostering economic growth. We will use our competitive advantages and strengths to gain a bigger share of the national and international market for oil and gas and electricity, as well as for local industrial and commercial goods and services.

Some of the other actions our energy strategy covers include the following:

- *Coal is the primary fuel that generates Nova Scotia's electricity, and will be for many years to come. Government will continue to encourage the use of local coal in an environmentally responsible manner.*

- *Our government will take firm actions to improve the quality of the province's environment by reducing air emissions and working closely with the federal government on climate change issues.*

- *Together with Nova Scotia Power Inc., we will take action to encourage the growth of Nova Scotia's renewable energy resources, especially wind power. In addition, we will carefully introduce competition to the electricity industry through policies that permit municipal utilities and new generators to access the transmission system.*

- *Conserving fuel used for electricity and transportation is a wise and important utilization of energy. We will introduce programs to encourage the conservation and more efficient use of energy in Nova Scotia.*

To ensure that Nova Scotians get the most from these energy resources and to provide the greatest employment and business benefits possible, government must be clearly focused and have sufficient and capable human resources. Therefore, government will create a new Department of Energy to implement the energy strategy and to provide leadership and management for its responsibilities in a growing energy industry.

Governments all around the world are being challenged to manage rapid and complex changes. The terrorist attacks of September have driven home the importance of reliable, secure supplies of all forms of energy. As a result, Nova Scotia's political stability and proximity to the large northeastern US markets are taking on more importance. We are also very fortunate as Canadians to be energy self-sufficient and, in fact, one of the few nations in the world to be net energy exporters.

Our energy strategy will help Nova Scotia generate more electricity from cleaner-burning energy sources such as natural gas and from renewable resources such as wind power. We will take actions to increase energy research and development, maintain a competitive business climate, and ensure that future generations of Nova Scotians benefit from our non-renewable oil and gas resources. Once revenues become significant we will create the Nova Scotia Offshore Heritage Trust and invest a share of energy revenues in the trust for future generations. To make this possible, we must receive a higher share of our offshore revenues. Therefore, we will continue to pursue with passion and conviction our belief that Nova Scotians should be the principal beneficiaries of our offshore resources. Our Offshore Accord agreement with the Government of Canada must fulfill its original intent.

To gain the benefits from our energy resources, Nova Scotians will need to embrace change that results from a growing energy sector and create new relationships with individuals, companies, and countries all around the world. We must seize the opportunity to build a better Nova Scotia and secure our future. Our voyage will respect the environment and leave our province a better place for our children. That is the legacy we want from our new energy strategy.

John Hamm

John F. Hamm
Premier of Nova Scotia

INTRODUCTION

The energy strategy for Nova Scotia is like a roadmap of major highways. It gives the directions to the most significant places. It shows a clear, broad picture of the landscape. With this map, the government has the means to make sure we reach our destination.

Nova Scotia's new energy strategy is about finding new energy resources and managing those we already have. It shows how we can use our energy resources to achieve economic and social benefits in an environmentally responsible manner.

Volume 1 of the strategy is developed around three major themes:

- *Powering the Economy*
- *Improving the Environment*
- *Securing our Future*

Volume 2 is a series of background papers on 17 different topics. It contains more detailed objectives and actions on a wide range of energy-related issues, as well as the background analysis that has been done in support of the directions chosen.

The province's new energy strategy is a living strategy, designed to be realistic and flexible with respect to future events and time frames. The strategy's short-term focus looks ahead to 2005. Its longer-term goals and actions address a vision extending well beyond.

The strategy has been developed at a time when Nova Scotia is facing new energy opportunities and challenges. The development of a large natural gas project offshore, and the belief there is more to come, gives us a growing presence on the world energy map. In 2001, the province became a net exporter of energy, moving our overall trade balance into surplus for the first time in several generations.

Taking full advantage of our energy opportunities requires significant change. Energy will become a larger part of Nova Scotia's economy, culture, and way of life. The people of Norway and the United Kingdom have already adapted and prospered from immense petroleum discoveries and developments off their coastlines over the past 30 years. We will learn from their experiences.

Nova Scotia's energy industry has undergone profound change over the past decade. The 1990s opened with Nova Scotia Power changing from a Crown corporation to a shareholder-owned private corporation. The utility now operates with the responsibilities, accountabilities, and disciplines that the marketplace imposes on a publicly traded company. Changes in other parts of North America's electricity system mean that more challenges and opportunities lie ahead.

Maritimes & Northeast Pipeline
STORA

Photo courtesy of the Nova Scotia Petroleum Directorate

M&NP Metering Station
Sable natural gas is transported through the Maritimes & NorthEast pipeline and the Point Tupper lateral to StoraEnso and other industrial users in Cape Breton.

On December 31, 1999, as the decade closed, the Sable Offshore Energy Project (SOEP) began production. It proved our ability to deliver large amounts of energy to markets in the Maritimes and the United States and led to new jobs and new business growth. It attracted the attention of many companies, large and small, that are now spending more than $1.5 billion to find new oil and gas resources off Nova Scotia's coast.

The environmental landscape is also in transition. In 1997 more than 160 countries signed the Kyoto Protocol to deal with the issue of global climate change. Continuing concern over issues such as acid rain has focused greater attention on environmental issues related to energy.

Nova Scotia's coal industry, a mainstay of Nova Scotia energy for more than 300 years, is also undergoing change. The province's last underground coal mine has closed. As imports of low sulphur coal shipments rise, domestic coal plays a smaller role in the generation of our electricity.

Nova Scotia's prosperity, our standard of living, and our quality of life will be greatly influenced by how we discover, produce, consume, and distribute our energy resources. We need to use energy more wisely, expand energy technologies through research and development, and ensure that we have the infrastructure required for a growing energy sector and economy. The energy strategy provides a window of opportunity for Nova Scotia to address a wide range of economic and social goals. The energy strategy provides the framework by which we can seize this opportunity for the benefit of all Nova Scotians.

VISION

An energy industry balancing economic growth, social goals, and respect for the environment for generations of today and tomorrow is essential for Nova Scotia to achieve its vision of becoming one of the best places in the world to live and to work.

A successful energy industry will lead the transition and diversification of the province's economy. It will provide people with enduring social and economic benefits. Over the longer term, a dynamic and vibrant energy industry will:

- *enhance our standard of living by contributing to economic growth and enable us to pay for our education, health, and other public services while reducing tax and debt burdens*
- *improve our environment*
- *become an important and positive part of our economy*

GOALS

The energy strategy has three main goals, which were discussed, debated, and confirmed during the public consultation process. They are:

- *to create a world-class energy sector that achieves sustainable economic development in balance with high social and environmental standards*
- *to optimize financial, economic, and social benefits in the province's rapidly expanding offshore energy sector*
- *to improve the province's environment and enhance the quality of life of Nova Scotians*

VALUES AND PRINCIPLES

Before beginning the consultation process, the government identified and approved a set of values and principles as the foundation of the energy strategy. These values and principles helped focus many of our discussions and provided signposts against which options could be weighed.

1. *Public consultation, fairness, transparency, accountability, and responsible regulatory practices will guide public sector energy policy making.*
2. *To the extent possible, the supply, demand, and price of energy products and services in Nova Scotia will be guided by policies that encourage consumer choice and competition.*
3. *The private sector is an essential partner in the management and growth of Nova Scotia's energy industry. It will be the source of most of the innovation and capital investment required to develop and expand this globally competitive sector.*

4. *Nova Scotians should be the primary beneficiaries of the industrial benefits and revenues generated by the province's energy resources. These benefits will be distributed as widely as possible throughout the province.*
5. *Improving the environment will be an objective in energy policy-making decisions.*
6. *The energy needs of the Nova Scotia marketplace are best served by having a diversity of reliable energy sources and pursuing efficiency and conservation initiatives.*

Federal Energy Goal

"...to help Canada become the world's smartest steward, developer, user and exporter of our energy resources."

— Ralph Goodale, Minister of Natural Resources Canada

HIGHLIGHTS OF THE PUBLIC CONSULTATION

The advice received from the public during workshops, consultations, and submissions and the recommendations from industry participants and experts in stakeholder meetings and forums were characterized by a number of consistent themes:

- *think long term*
- *learn from lessons elsewhere*
- *maximize economic benefits to Nova Scotia*
- *improve the environment*
- *increase renewable energy production*
- *take a cautious approach to competition in the electricity sector*

The Premier's June 2001 Energy Forum, Open to the World, discussed and debated a wide agenda of energy, environmental and economic issues. Local, national, and international energy executives, academics, and organizational leaders and the general public dealt with such questions as What can Nova Scotia's energy industry deliver for its citizens? What are realistic expectations for Nova Scotia's energy sector? What are the most important elements for creating a competitive business climate? How can we ensure that the environment is protected while cross-industry alliances and partnerships are encouraged?

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20 Victoria Street
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The Energy Forum heard useful advice on leveraging Nova Scotia's energy advantages.

- *Promote our political stability, proximity to markets, and high resource prospectivity to significantly increase offshore exploration.*
- *Expand gas use in Nova Scotia for commercial, industrial, and residential purposes.*
- *Achieve environmental gains through new energy technologies and the protection of sensitive areas.*
- *Promote wise energy use and end-use efficiency.*
- *Encourage renewable energy sources such as wind power for generating electricity.*
- *Increase competition in the electricity marketplace.*
- *Support opportunities for the province's indigenous coal industry.*

Here are some of the conclusions arrived at during the Energy Forum.

- *Nova Scotia's energy sector has tremendous potential.*
- *Nova Scotia does not have a monopoly on opportunity, as this is a worldwide industry.*
- *Economic gains can be created only if exploration results confirm that sufficient reserves are available for development.*
- *Growth of the various segments of Nova Scotia's energy industry must be achieved in coordination with sound environmental principles, including sustainable development.*

> **"The province should start with a clear understanding that it does not have a monopoly on opportunity, and that the development of this type of resource should begin with a co-operative approach among government, labour and industry."**
>
> *— John Reed – Executive Director, Navigant Consulting, Inc., Energy Forum*

NOVA SCOTIA'S COMPETITIVE ADVANTAGES

Nova Scotia's energy sector is a complex mixture of energy producers, distributors, and consumers. Energy consumers depend largely upon refined products from imported crude oil and electricity from an industry that primarily uses coal for generation. The balance comes from hydro-generated power, oil, biomass, and recently, natural gas.

Nova Scotia Primary Energy Supply *(1999)*

Fuel	**Terajoules**	**%**
Oil	177,129	62%
Coal	88,391	31%
Biomass*	17,733	6%
Hydro	3,842	1%
Total	287,095	100%

**includes spent pulping liquor*

Source: Statistics Canada, *Quarterly Report on Energy Supply-Demand in Canada*
Biomass use was estimated by the Nova Scotia Department of Natural Resources

Our energy export market has shifted dramatically since the beginning of offshore natural gas production. Nova Scotia has gone from being a minor exporter of electricity to supplying the equivalent of 20 per cent of the natural gas consumed in New England.

These changes have focused government and the energy industry on Nova Scotia's competitive advantages and challenges.

- *Nova Scotia's geographic position puts us close to key markets, and its political stability offers security of supply for our natural gas customers and potentially for future electricity exports.*
- *Offshore Nova Scotia is considered to have the potential for significant new discoveries of oil and gas—a view that is strengthened by the recent rounds of exploration commitments.*
- *The province has one of North America's highest per capita concentrations of higher-education institutions, a strong research culture, a desirable quality of life, and a flexible and upwardly mobile workforce.*
- *Beginning in 2001, Nova Scotia became a net exporter of energy.*
- *The province has some of the lowest electricity rates on the eastern seaboard.*
- *Energy companies are building a petroleum industry infrastructure in Nova Scotia at a time when the northeastern United States is in need of additional energy supply.*

Electricity Price Comparison: Northeastern Region *(cents/kWh)**

Sector	**New England**	**PEI**	**NB**	**NS**
Industrial	11.94	6.49	5.51	5.57
Commercial	14.15	12.54	11.39	10.40
Residential	16.89	11.10	10.09	10.08

**Average price in cents per kWh (excluding taxes), October 2001*

Source: Emera Inc. Submission to Nova Scotia Energy Strategy Task Force

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POWERING THE ECONOMY

The production, consumption, and export of energy contribute to a prosperous, growing, and competitive economy. Energy products are essential to the quality of life and the living standards of Nova Scotians.

Nova Scotia has access to a diverse supply of reasonably priced and accessible energy sources: primarily coal, oil, hydro, natural gas, and wood biomass. It has the potential for additional renewable sources such as wind and solar and for larger supplies of natural gas and oil.

It is a priority to create and sustain an environment in which energy resources can be economically developed in a manner that benefits all Nova Scotians.

OIL AND GAS

Nova Scotia's petroleum sector has existed for a century. Over that period it has grown into a significant oil refining and product distribution system, which fuels our furnaces, runs our cars and powers our industries. The sector is dominated by products derived from imported crude oil.

The addition of a growing offshore oil and gas industry has changed this sector significantly. The offshore industry began with the Cohasset-Panuke project in 1992. It grew rapidly when Sable natural gas started flowing in December 1999. In the first year of production, the Sable project exported almost $920 million of products. Natural gas is likely to be our largest export in 2001.

The North Sea provides a good example of the value that can be obtained from a well-established offshore oil and gas industry. Both the United Kingdom and Norway, with more than 30 years of experience, offer important lessons for Nova Scotia.

The first and most important lesson is that the size of the resource is central to the industry's success. Throughout its history, the North Sea has been marked by consistently large discoveries. While Nova Scotia was struggling to find enough natural gas to make one project economically viable, the United Kingdom and Norway were bringing on stream project after project. Many of them were larger than anything yet seen off the coasts of Nova Scotia or Newfoundland and Labrador.

Comparable Offshore Oil and Gas Production and Reserves, 2000

	Norway	United Kingdom	Nova Scotia
Oil production	**3.1 million bbl/d**	**2.6 million bbl/d**	**–**
Oil reserves – proven	27 billion bbl	5 billion bbl	–
Natural gas production	**3.8 bcf/d**	**9.1 bcf/d**	**0.5 bcf/d**
Natural gas reserves	123 tcf	27 tcf	6 tcf

Today, new technology and better-quality seismic data are setting the stage for a major increase in offshore exploration. There is now a strong degree of industry optimism about our prospects.

The province is also seeing increased industry interest in our onshore potential. Exploration is rising and pipeline infrastructure makes potential developments more economic. This enthusiasm is based upon assumptions about our resource potential and ready access to markets in eastern North America that need more energy.

The West Navion Drill Ship
One of the world's most modern and powerful deepwater drill ships will begin drilling Nova Scotia's first modern deepwater well for Marathon Canada Limited in late 2001 or early 2002.

Photo courtesy of Smedvig asa, Norway

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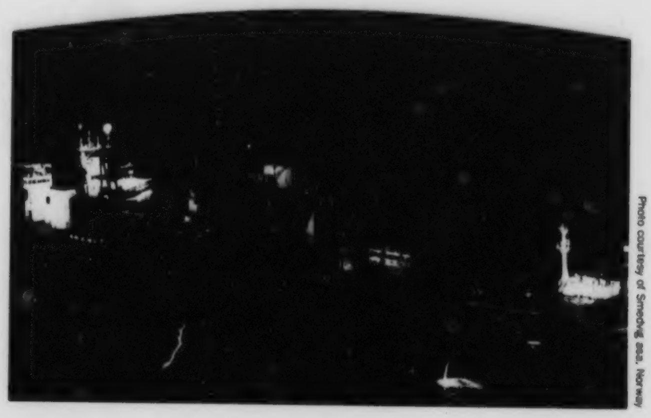

Photo courtesy of Smedvig asa, Norway

ACTIONS – OIL AND GAS

The government will maximize the value of Nova Scotia's non-renewable oil and gas resources through a number of actions.

- *Work with the federal government and industry to update the estimate of Nova Scotia's resource potential.*
- *Maintain a stable regulatory and fiscal regime to encourage more exploration.*
- *Maximize the economic value of the province's offshore resources by fully participating in the regulatory approval process.*
- *Negotiate Nova Scotia offshore strategic energy agreements (OSEA) to ensure that projects meet provincial objectives for increasing employment, expand local business opportunities, increase training, research, and development, and set the stage for value-added industrial development, including petrochemicals.*
- *Streamline provincial regulations and work with the federal government to remove inefficiencies and overlap in the regulatory environment.*
- *Help develop training and human resources plans by bringing labour, management, and government together and encouraging them to continue to work as partners.*
- *Work with Mi'kmaq organizations and the private sector to identify opportunities for greater Mi'kmaq participation in the energy sector.*

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The recently developed United States National Energy Policy (May 2001) predicts that over the next 20 years the United States will need to increase oil and oil product imports by 33 per cent. Natural gas consumption is forecast to grow by 50 per cent during the same period. This means the annual American demand for gas will increase by 8.5 trillion cubic feet, the equivalent of more than 40 SOEP projects.

The source of American imports is shifting. Saudi Arabia remains the world's leading producer of oil, and OPEC still has the largest impact on global prices. However, in the first half of 2001 the United States imported 9.2 per cent of its petroleum from Canada. That makes our country the largest single supplier to the American market. The east coast of Canada could become a significant new source of energy for North America.

Government Responsibility

The responsibility of the government is twofold. First, as resource owner it acts on behalf of the people. In this role it promotes responsible exploration and development and works to optimize economic value and benefits to Nova Scotians. Second, as steward for the public good, it must ensure that developments are consistent with social objectives such as environmental quality, health, and safety.

Objectives

The strategy sets four primary objectives for oil and gas development:

- *to determine the scope of the resource*
- *to develop the capability to maximize Nova Scotia employment, training, R&D, and optimize opportunities for existing and new Nova Scotia–based companies*
- *to set the stage for expanded industrial, commercial, and residential use of gas and gas liquids in Nova Scotia*
- *to ensure that developers have access to export markets for production that is surplus to Nova Scotia's needs*

Photo courtesy of the Nova Scotia Petroleum Directorate

Statia Terminal
A ship unloads petroleum at the Statia Terminal in Cape Breton.

Strategic Actions

Defining the Resource Scope

Nova Scotia now has more than $1.5 billion in exploration commitments on active onshore and offshore licence blocks. Industry clearly believes there is more oil and gas to be found; their estimates suggest a potential in the range of 40 trillion cubic feet. However, the amount of proven reserves is still relatively low. Most of the six trillion cubic feet of discovered gas is already in production or planned for production.

Nova Scotia is under-explored. Compared to the North Sea and other well-established offshore areas, development of Nova Scotia's offshore is in its infancy. Finding oil and gas requires the drilling of very expensive wells. The cost runs between $25 and $60 million or more per well. Therefore, promoting exploration is an important priority for the government and industry.

ACTIONS – OIL AND GAS con't

- *Limit utility corridors for landfall of oil and gas and require all offshore pipelines to land in Nova Scotia.*
- *Rely on market forces to establish the supply, demand, and pricing of gas and liquids in Nova Scotia.*
- *Revise local gas distribution policies to create the conditions for expansion of natural gas into businesses and homes.*
- *Support the most efficient means of transporting surplus oil and gas to export markets.*

Longer Term

- *Review licencing and bidding processes once broad exploration effort is complete.*

Numbers of Exploration Wells

Year	Nova Scotia	U.K.North Sea
1964–1974	46	336
1975–1984	38	606
1985–1994	20	874
1995	0	60
1996	0	72
1997	0	61
1998	1	47
1999	3	16
2000	3	26
Total	111	2098

Sources: Department of Trade and Industry United Kingdom, historical records and Appendix 4 of the *Development of the Oil and Gas Resources of the United Kingdom 2001;* Canada-Nova Scotia Offshore Petroleum Board, *Directory of Wells;* Nova Scotia Petroleum Directorate.

Uncertainty over the size of the resource in offshore Nova Scotia means that policy making must be flexible. Once the size of the resource is more certain, new options will emerge that affect the pace of exploration, the size and timing of developments, and opportunities for industrial development.

The Nova Scotia government will help reduce uncertainty by working with the Canada–Nova Scotia Offshore Petroleum Board (CNSOPB), industry, and the federal government to update the estimate of Nova Scotia's resource potential. This will help governments, businesses, and individuals better understand the potential impact, its expected life cycle, and the means by which advantages for Nova Scotians can be maximized.

Encouraging Exploration

Financing for this expensive offshore exploration effort is the responsibility of the private sector. Oil and gas companies operate worldwide, establishing their exploration budgets in a way that maximizes returns and minimizes risks. Nova Scotia must be able to compete with other parts of the world that offer similarly attractive prospects.

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1964–1974	46	336
1975–1984	38	606
1985–1994	20	874
1995	0	60
1996	0	72
1997	0	61
1998	1	47
1999	3	16
2000	3	26
Total	111	2098

Sources: Department of Trade and Industry United Kingdom, historical records and Appendix 4 of the *Development of the Oil and Gas Resources of the United Kingdom 2001;* Canada-Nova Scotia Offshore Petroleum Board, *Directory of Wells;* Nova Scotia Petroleum Directorate.

Uncertainty over the size of the resource in offshore Nova Scotia means that policy making must be flexible. Once the size of the resource is more certain, new options will emerge that affect the pace of exploration, the size and timing of developments, and opportunities for industrial development.

The Nova Scotia government will help reduce uncertainty by working with the Canada–Nova Scotia Offshore Petroleum Board (CNSOPB), industry, and the federal government to update the estimate of Nova Scotia's resource potential. This will help governments, businesses, and individuals better understand the potential impact, its expected life cycle, and the means by which advantages for Nova Scotians can be maximized.

Encouraging Exploration

Financing for this expensive offshore exploration effort is the responsibility of the private sector. Oil and gas companies operate worldwide, establishing their exploration budgets in a way that maximizes returns and minimizes risks. Nova Scotia must be able to compete with other parts of the world that offer similarly attractive prospects.

"We talk as if we've made it in the oil and gas business, but the reality is that companies have choices of where to invest and we're just one of the choices. I hope the strategy is a living document and the government process will be a continuum for input."

— Sir Graham Day, Roundtable Co-Chair, Energy Forum

Being competitive means going beyond the resource size and market factors. It also takes into account the cost of complying with government rules and regulations. In the case of the offshore oil and gas industry, the requirements are significant. In 1969 the rulebook ran to 24 pages, while in 2001, the Canadian Association of Petroleum Producers (CAPP) created a regulatory roadmap that takes more than 200 pages just to describe the processes. Keeping these processes as efficient as possible is crucial.

The provincial government, in partnership with the federal government, will work to create and maintain regulatory, fiscal, and taxation regimes that are efficient, effective, and competitive with those in other regions.

Developing Offshore Resources to Benefit Nova Scotians

The development of Nova Scotia's first major offshore project, the Sable Offshore Energy Project (SOEP), began in 1997. The two partners—the province and the developers—signed a number of agreements that clearly set out their expectations and commitments. Topics of agreement included training, research and development, production plans, and access to natural gas and natural gas liquids. The agreements helped reduce uncertainty and were beneficial for both parties.

SOEP spent approximately $2 billion up to the end of 1999. The province's review of local industry during this period indicates our actual and potential capacity to participate directly in that expenditure was in the range of $900 million to $1 billion. For example, while the province was capable of supplying services such as offshore supply boats and welders, it was not capable of manufacturing the steel pipe that was used in the project development.

Approximately $620 million (62–69 per cent) of this longer-term potential was spent on Nova Scotian goods and services, an impressive performance given that

Sable Offshore Energy Inc. Memorandum of Understanding

A memorandum of understanding and seven follow-up agreements were signed between the province and the Sable Offshore Energy Incorporated (SOEI) partners. These agreements cover a number of important issues:

- *Funds are provided by SOEP producers to be used by the province to reduce the delivered cost of natural gas to consumers in Nova Scotia.*
- *Gas volumes are set aside by the producers to ensure that natural gas is available for Nova Scotians.*
- *The SOEP producers are committed to supplying ethane and natural gas liquids to future petrochemical projects in Nova Scotia.*
- *Initiatives support training programs and research and development related to the offshore.*
- *Measures ensure that production plans filed are carried out in a way that protects the royalty interests of the province.*
- *Potential legal action against the province regarding the sale of Nova Scotia Resources Limited was settled through two agreements.*

it was the first major offshore project and that our companies competed through worldwide tenders. Another $153 million was provided by companies elsewhere in Canada. As the industry changes through time, particularly as developments move to deep water, its needs will change. Nova Scotia's capabilities to supply these projects will also evolve over time. As the provincial industry's capacity expands, the economic value of future projects (direct spending on goods and services, supply agreements, training, research and development, etc.) should reach a higher share of our potential.

What is the province's ultimate goal? It is to achieve 100 per cent of Nova Scotia's potential. Government will take firm actions in pursuit of this goal.

A number of components constitute the economic value and benefits a project should deliver to Nova Scotians. Some of these include the right of pipeline ownership or compensating offset, the supply of feedstock for a petrochemical industry, the supply of natural gas for distribution to business and homes, contributions to the advancement of energy research and development, support and contribution for training and apprenticeship of Nova Scotians, and domestic and export opportunities for the use of local supplies in each project. It is recognized that the economic value of each of these components will vary by project, depending on the increasing capabilities of Nova Scotians and the structure, characteristics, and market conditions of each project.

Government will vigorously pursue opportunities to maximize the economic value of its offshore resources by full participation in the regulatory approval process. Government's position on the project will depend upon the degree to which a project meets the province's objectives.

Currently, each project must have an approved development plan, including a benefits plan. The province will have three primary roles in the approval process:

1. It will be an active intervenor, presenting the province's position through evidence.
2. With respect to certain elements of the project, the province is the regulator (for example, through the UARB and as an equal partner in the CNSOPB).
3. The provincial minister has the final authority to accept or reject the development plan.

Offshore Strategic Energy Agreement

The government believes it is in the best interests of both parties to clearly understand each other's expectations and obligations regarding the project, prior to the full regulatory process. It would prefer to enter into an offshore strategic energy agreement (OSEA) for each project.

These voluntary agreements would be reached with a clear understanding of the market conditions facing the proposed development, the capabilities of Nova Scotians to provide goods and services, and the expectations of the province.

In reaching an OSEA, the government will obtain energy industry expertise as part of the province's negotiating team. The objective will be to complete such agreements within specified time frames. An OSEA will have a clear dispute resolution mechanism. The government and the developer will come to an understanding of Nova Scotia's capabilities. Success will be measured by the extent to which Nova Scotia achieves its potential.

Photo courtesy of PanCanadian Energy Corporation, Halifax, Nova Scotia

PanCanadian Engineering Team
PanCanadian's engineering team reviews plans for its Deep Panuke Project.

Continual long-term growth in the offshore will allow Nova Scotia to strengthen and diversify its economy. Therefore, an OSEA will place particular emphasis on proposals that create opportunities for Nova Scotian firms to export or expand into other sectors. The agreement will also give consideration to how the design of the project (e.g., offshore vs. onshore gas processing) contributes to achieving the province's oil and gas objectives.

The major elements of the economic value of a project to Nova Scotia are to provide for pipeline ownership or compensating offset, to supply petrochemical feedstocks, to provide access to natural gas, to support and contribute to training and apprenticeship, to support and contribute to research and development, and to support the use of local suppliers in the project and worldwide supply chain.

Creating an Efficient and Effective Regulatory Environment

The government recognizes that the regulatory system employed in the Nova Scotia offshore area is in its infancy. Government is trying to adapt to an industry that is just beginning to develop and grow. The joint management regime in the offshore area has added substantial complexity to an already complex system. It is not surprising that inefficiencies and overlap have crept into the regulatory processes used by a large number of federal, provincial, and joint regulators.

The Nova Scotia government recognizes that, in partnership with the federal government, it has the responsibility to remove these inefficiencies and overlaps. In doing so, the governments will contribute substantially to improving the competitive position of offshore Nova Scotia.

The province will take a number of specific steps to achieve this end. The Canada–Nova Scotia Offshore Petroleum Resources Accord Implementation Act, for example, should be reviewed and updated where appropriate. The first priority is to implement changes necessary to properly protect the health and safety of offshore workers. Other priority areas are being identified in partnership with industry and the federal government.

The government will help lead discussions with the regulators, the federal government, and the Canadian Association of Petroleum Producers (CAPP) on the issues raised in CAPP's assessment of regulatory issues. An assessment of the benefits-related information submitted to all levels of government should lead to streamlining of these reporting requirements and more effective use of this information. Government will minimize provincial regulation of offshore projects that are adequately covered by other regulatory agencies.

The government will streamline its provincial regulations. The preparation of a new Energy Act is one such step. It will ensure that the Nova Scotia Utility and Review Board (UARB) and the CNSOPB have sufficient resources to undertake their regulatory activities.

"It is incumbent on us as a service company to train our own employees, not always to look to government. We have 600 people working for us—300 of which are elsewhere in the world. These are high paying jobs that bring new money to Nova Scotia from around the world."

— Fred Smithers – President & CEO, Secunda Marine, Energy Forum

Developing the Workforce

Marconi Campus Instrumentation Lab Students train for offshore jobs in the Instrumentation Lab at the Nova Scotia Community College - Marconi Campus.

Photo courtesy of the Nova Scotia Community College, Cape Breton, Nova Scotia

The government wants to use the growth of the energy sector as an opportunity for Nova Scotians to gain new skills and well-paying jobs. Government will help develop training and human resources plans by bringing labour, management, and government together and encouraging them to continue to work as partners.

"Investment in human capital, intellectual capital, is important."

— Anne Fawcett – Managing Director, Caldwell Partners, Energy Forum

Government's prime role in developing the workforce is public education and general training. The private sector will have prime responsibility for identifying training needs and contributing capital for such training. The government will advise on programs that can be created. It will also negotiate opportunities for Nova Scotians to upgrade their job skills and gain experience. Nova Scotians will come first. However, Nova Scotia's approach will be outward looking. It is recognized that under certain circumstances some skills and professions may not be available in Nova Scotia, and individuals who bring these skills and professions from other regions are welcome.

Aboriginal Opportunities

The energy strategy recognizes the importance of increasing economic opportunities in the energy sector, including employment and joint venture opportunities, for Nova Scotia Mi'kmaq. To date, Sable Offshore Energy Inc. and Maritimes & Northeast Pipeline Limited have entered into working relationships with various Mi'kmaq bands. In addition, discussions are under way with other energy companies.

Government will work with Mi'kmaq organizations and the private sector to identify opportunities for greater Mi'kmaq participation in the energy sector. It will also work with the Government of Canada to ensure that appropriate training and education opportunities are available to enable Mi'kmaq to take advantage of employment and business opportunities.

Using Our Oil and Natural Gas Resources

Using our energy resources in Nova Scotia is a priority for the government. Natural gas and natural gas liquids open up the possibility of a petrochemical industry. Gaining access to the ethane in the natural gas and the natural gas liquids is an important starting point for an industry that normally takes 5 to 10 years to develop. The provincial policy is that each project that can make a meaningful contribution to the growth of a petrochemical industry will deliver the products to a suitable location on commercial terms. Implementation of a policy of "offshore utility corridors" and the requirement that offshore pipelines land in Nova Scotia will also help concentrate raw material supplies.

Photo courtesy of the Nova Scotia Petroleum Directorate

StoraEnso
The StoraEnso facilities at the Strait of Canso are one of the first industrial users of Nova Scotia natural gas.

The government will work to attract a broad mix of value-added industrial and commercial businesses that use natural gas or oil. The success of SOEI and increased exploration have already initiated interest from potential smelters, petrochemical companies, and electricity generators.

The government believes that the method most likely to establish a true value for provincial resources is one that is based on what the open market is prepared to pay. While artificially low prices would produce some short-term gains for those able to use the commodity in significant volumes, such low prices transfer the benefit of Nova Scotia's resources to the owners and customers of such companies. Artificially low prices may also dampen interest in discovering new sources, and thus put the province at a disadvantage over the long term. Government will support new economic growth, but not by creating artificially lower prices for our natural resources.

The government plans to enhance the development of local gas distribution on a commercial basis. It will act to put into effect a number of policies (see the background paper in Volume II, 'Using Nova Scotia Resources') that include:

- *eliminating natural gas distribution targets*
- *developing standard municipal operating and tax agreements*
- *using natural gas in government buildings*
- *delivering natural gas information programs*
- *permitting distributors to sell gas*

The government recognizes that setting up a totally new energy system is a challenge for regulators. It will continue work to reduce regulatory costs associated with developing a natural gas distribution system. The system will be streamlined by eliminating overlap and duplication and by providing efficient regulatory processes. In light of potential new responsibilities, the resources of the UARB will be reviewed.

The province has clarified provincial gas storage responsibilities. Legislation was passed in November 2001 that will be put into effect in the spring of 2002. Underground gas storage allows the owner of natural gas to store gas when it is priced relatively low or in weak demand and to withdraw gas from storage when it is expensive or in strong demand.

Expanding Markets through Exports

The private sector is anticipating major new discoveries in the Nova Scotia offshore. The pipeline sector is planning infrastructure that would support production of up to two billion cubic feet of natural gas per day. If the assumptions about our offshore potential are correct, production at that level would far exceed our own requirements. Because development of a resource base of this magnitude requires substantial markets, exports to areas of high demand such as the northeastern United States will be required.

Nova Scotia will ensure that we export only those resources surplus to our needs. These policies will include requirements for commercial access in Nova Scotia through either the normal regulatory process or OSEA negotiations and the stipulation that all offshore pipelines 'land' in Nova Scotia before going to market.

Whereas North American energy consumers will continue to be affected by fluctuating supply and volatile prices, there will be opportunities for future growth in the Canadian oil and gas industry. Nova Scotia has an exciting opportunity to play a major role in this growing industry.

"As Emera diversifies into the larger energy scene, there is a real excitement in getting into new opportunities in the U.S. and at home."

— David Mann – President & CEO, Emera Inc., Energy Forum

ELECTRICITY

NSPI Energy Source for Electricity, 2000 *(%)*

	%
Coal	77.5
Oil	11.8
Hydro	7.7
Purchased Power	2.6
Natural Gas	0.4

Source: Emera Inc. 2000 Annual Report

A priority for people and businesses in Nova Scotia is an electrical energy supply that is secure, reliable, affordable, and produced in an environmentally responsible manner.

Nova Scotia's electrical industry is dominated by Nova Scotia Power Inc. (NSPI). Through its parent company, Emera Inc., NSPI is one of Nova Scotia's largest publicly traded corporations. It is a vertically integrated monopoly, which is to say it owns and operates most of the electrical generation capacity (97 per cent), transmission (99 per cent), and distribution system (95 per cent) in the province. The remaining share of the system is owned and operated by six municipal utilities: Canso, Antigonish, Berwick, Riverport, Mahone Bay, and Lunenburg.

Since NSPI was privatized in 1992, electricity rates have been stable, as cost increases over this period have been offset either by operating efficiency or by additional profits such as those gained through the recent export sales of natural gas. This period of stability may be changing. NSPI is currently under pressure from higher fuel costs, particularly world coal prices, and the declining Canadian dollar, which further increases the costs of imported products such as coal. NSPI's expected increases in corporate income tax, both federal and provincial, provide additional pressures in the near to medium term. The current low tax position of the company will end when it has used up most of its tax deferral allowances on its fixed assets. By 2003–04, NSPI expects to be fully taxable. NSPI also has an outstanding tax dispute with the Canada Customs and Revenue Agency that could significantly affect electricity rates if it is not settled in the utility's favour.

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ACTIONS – ELECTRICITY

The strategy for the electricity industry is to carefully increase competition and encourage the growth of renewable energy sources in Nova Scotia. This will be accomplished through a number of actions:

- *Establish an electricity marketplace governance committee (EMGC) to recommend to the Minister of Energy the implementation, development, structure, and rules for the future electricity sector.*
- *Give policy direction for the UARB to authorize open access transmission on NSPI facilities for all generators selling to wholesale customers or export markets.*
- *Introduce competition within the electricity sector in a staged and measured process beginning with supply to wholesale customers (currently six municipal utilities).*
- *Introduce competition for future electricity generation.*
- *Assist the development of an independent power producers' (IPP) renewable sector by permitting access to the NSPI transmission system for green-power customers and setting with NSPI a voluntary target of 2.5 per cent (50MW) for new renewable generation by IPPs.*
- *Develop information programs to promote the use of renewable energy technologies.*

con't ➜

Electricity production and transmission are increasingly subject to competition from within the region and elsewhere in North America. The experience of increased competition in electricity markets has been mixed. The benefits of increased competition would include greater market efficiency, leading to better cost efficiency over the long term and consistency with other jurisdictions that are our trading partners. Although it is not necessary for Nova Scotia to develop a fully competitive market in the near future, some steps are being taken in anticipation of industry changes.

Nova Scotia's electricity market is relatively small, and our access to new competitive sources is limited. However, electricity is sufficiently important to individuals and business that any increase in competition should be introduced carefully over a prudent time frame. Over the longer term, the introduction of increased competition will encourage new businesses to build new generating capacity for electricity in Nova Scotia and for export. This will result in a market-driven industry and improved efficiencies for all customers.

Historically, when NSPI has asked the UARB for approval to build new generation facilities, it has also asked for permission to build any related transmission facilities. In many jurisdictions, electricity restructuring has uncoupled these responsibilities. In these restructured electricity markets, only investments in transmission infrastructure must be approved.

The lessons learned from elsewhere show that maintaining an adequate transmission infrastructure is vital to a growing generation system. It is an essential pre-condition for developing a robust, competitive market-based system. When the regulator assesses competing bids for new generation facilities in Nova Scotia, it will have to take into account the implications for the transmission system.

Government Responsibility

The provincial government through the UARB is the prime regulator of the Nova Scotia electricity sector. The National Energy Board is responsible for the administration of interprovincial and transborder transmission.

On a broader scale, the provincial government's responsibilities include ensuring that electricity is available and competitively priced. Ensuring a diversity of fuel sources and security of supply are also important public responsibilities, as is monitoring the introduction of technology, environmental improvements, and new electricity sources such as wind.

Objectives

The major objectives of the electricity sector are:

- *to maintain access to secure, reliable, and affordable electricity generated in an environmentally responsible manner*
- *to encourage long-term competition*
- *to promote the growth of renewable energy sources in Nova Scotia*

Photo courtesy of Communications Nova Scotia

Electrical Transmission *NSPI high voltage towers at the Strait of Canso.*

ACTIONS – ELECTRICITY *con't*

- *Take steps to meet US reciprocity requirements to export electricity.*
- *Encourage the use of indigenous coal resources and work to support an appropriate role for coal.*

Longer Term

- *Work with NSPI for the long-term retrofit or replacement of generating systems.*
- *Expand green energy programs.*

Strategic Actions

Opening up the Electricity Marketplace

Government will work with NSPI and other industry stakeholders to carefully and gradually open up the electricity marketplace in Nova Scotia. A number of public submissions, including that of NSPI, made this recommendation. This action is also in keeping with the strategy principle of encouraging competition for energy to the extent possible.

As a first step toward opening markets, the government will create an electricity marketplace governance committee (EMGC). The committee will report to the Minister of Energy and recommend the implementation, development, structure, economic considerations, and rules to introduce electricity competition. The EMGC will represent a wide range of stakeholder groups.

The government will provide policy direction to the UARB to authorize open access transmission on NSPI's facilities to implement market access for wholesale customers, retail customers of renewable generators, and export markets.

> **"We need a champion in government to nurture renewable energy as well as access to market."**
>
> *— Bridgewater Public Meeting*

The first group in Nova Scotia that will be able to purchase electricity competitively will be wholesale customers. The only wholesale customers currently in Nova Scotia are six municipal utilities.

The government will also allow competition for the construction of any future electrical generation. The UARB will determine when new capacity is required and call for bids from NSPI and any other producers. NSPI will continue to have an obligation to serve Nova Scotians.

Access to NSPI's transmission system and to wholesale and export markets will particularly benefit co-generators because of their potential to generate cost-efficient electricity from their existing operations.

The proposed phased restructuring maintains most features of the present system. NSPI remains a utility that is regulated, based on its cost of service. It retains its obligation to serve Nova Scotian customers, while the market is gradually opened up to increased competition. The EMGC will recommend the long-term structure and timing of any future changes in Nova Scotia's electricity market.

Electricity Restructuring

Entity	**Activity**				
	Open Access transmission	**Sells to NSPI**	**Sells to end use Customers**	**Sells to Wholesale *(6 municipal utilites)***	**Sells Export**
NSPI	X	X	X	X	X
Renewable Energy IPPs	X	X	X	X	X
Other NS Generators	X	X		X	X
Out of Province Generators	X	X		X	

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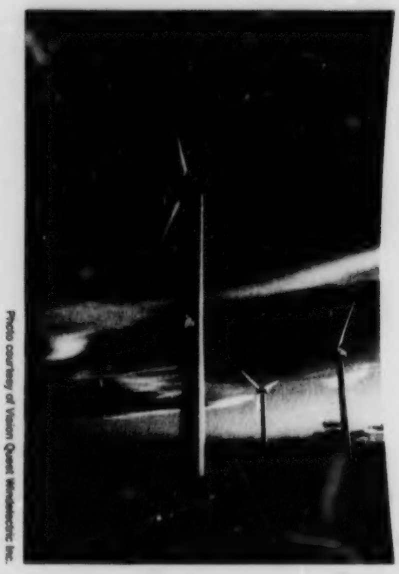

Wind Farm

Wind farms are already familiar sources of renewable energy in Alberta and Prince Edward Island.

Photo courtesy of Vision Quest Windelectric Inc.

Encouraging Renewable Energy Production

To promote rural electrical generation and greater use of renewable energy sources, the government will encourage renewable electricity production by independent power producers (IPPs). Policies will be created to allow IPPs using renewable energy sources such as wind to market "green power" directly to customers if they choose.

> **"In a regulated environment, the main electricity carrier has to be obliged to sell at a reasonable price into the grid from green electricity and be mandated to carry a certain amount of green power."**
>
> *— Stuart Smith – Chair, The National Roundtable on the Environment and the Economy, Energy Forum*

The government and NSPI will also create a short-term voluntary renewable energy target for new IPP renewable generation totalling 2.5 per cent of NSPI's current generation capacity, or approximately 50MW. The parties will monitor the voluntary renewable target for three years and then establish a longer-term mandatory renewable energy portfolio standard (RPS).

The government will work with the energy industry to develop information programs to promote the use of renewable energy technologies (such as wind, solar, and biomass-wood).

Preparing to Export Energy

The future direction of electricity markets in the United States is increasingly tied to the Federal Energy Regulatory Commission's (FERC) strategy for fostering competitive markets and securing a reliable, high-quality and environmentally responsible transmission infrastructure. FERC is seeking to achieve a seamless and highly efficient national grid.

To export electricity directly to United States customers, Nova Scotia must meet FERC's reciprocity requirements, including non-discriminatory, open transmission access, and access to wholesale markets. NSPI will also be required to account separately for its generation, transmission, and distribution divisions, including ancillary services. This will enable NSPI to cost its transmission service separately to the customer.

Managing Change Carefully

NSPI is a relatively small utility by North American standards. Retaining its vertically integrated structure and its economy of scale is considered very important for its residential and business customers. In many other restructured jurisdictions, utilities have been forced to sell part or all of their physical assets. At present, this step is not being considered in Nova Scotia.

These carefully measured steps by the province will not affect the present price advantage Nova Scotia has over competitors in the northeastern United States.

Using Coal for Electrical Generation

Total World Electricity Generation *(% by fuel - 1999)*	
Coal	38.1%
Gas	17.1%
Oil	8.5%
Nuclear	17.2%
Hydro	17.9%
Other*	1.6%

**Other includes solar, wind combustible renewables, geothermal & waste*

Source: International Energy Agency (IEA), *Key World Energy Statistics*, 2001 Edition

Coal is cost efficient and abundant and will continue to be a primary source for much of the world's electricity generation. Approximately 80 per cent of NSPI's electricity is currently generated by coal-fired plants that have between 5 and 30 years of remaining economic life. Actions by the federal or provincial governments or the industry must take into account the impact that any early retirement of generation units would have on electricity rates.

> **"Coal is still the cheapest way to generate electricity. It still needs to be part of the provincial energy mix, but the environmental issues associated with burning coal need to be addressed."**
>
> *— Port Hawkesbury Public Meeting*

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> *— Port Hawkesbury Public Meeting*

Unless the price increases dramatically, Nova Scotia will likely continue to use coal for a significant part of its electrical generation. Given that the province still has significant resources of coal in the ground, the government will continue to support the development of indigenous coal resources, where it is economically and environmentally appropriate.

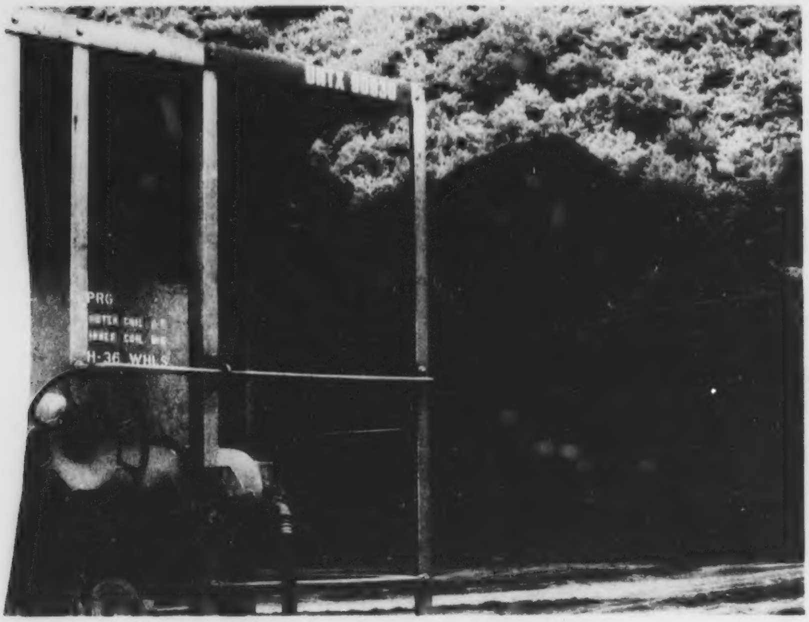

Photo courtesy of the Nova Scotia Petroleum Directorate

Coal Car at Strait Coal remains the primary fuel source for generating stations in Nova Scotia.

Government will work with the coal industry, NSPI, and other parties to support an appropriate role for coal in Nova Scotia's energy sector. Strategic actions that will be taken to support development of clean-coal technologies are discussed in the following section.

IMPROVING THE ENVIRONMENT

ACTIONS – ENVIRONMENT

Reducing the negative impacts of the energy sector on our air and oceans will improve our environment. The government will take the following actions:

- *Work with NSPI to reduce emissions of air pollutants, particularly SO_2, NO_x, mercury, and fine particulate matter.*
- *Continue to work in partnership with federal, provincial, and territorial governments in a national process to address the issue of global climate change and reduce emissions of greenhouse gases.*
- *Support the research and mapping efforts of federal agencies to provide better knowledge of marine environments and habitats.*
- *Help to address concerns of fishing and coastal communities about the environmental impacts of oil and gas projects by consulting before issuing exploration rights in areas within sight of land (18km) and requiring all ocean utilities to use offshore utility corridors.*
- *Show leadership in energy management and the use of cleaner energy sources.*
- *Support public information and education programs on energy management and the use of renewable energy sources.*
- *Support development of clean-coal technologies.*

Longer Term

- *Work to meet longer-term objectives for a reduction in air pollutants.*

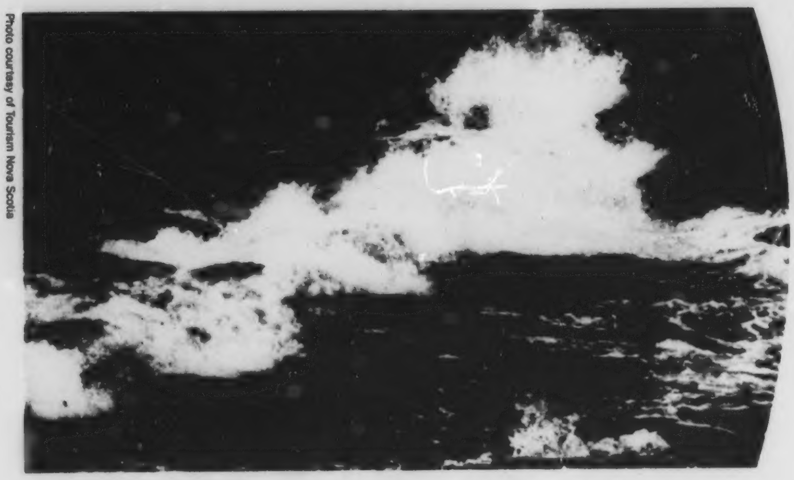

Photo courtesy of Tourism Nova Scotia

Nova Scotia Shoreline *The improvement of our environment is a priority for Nova Scotia.*

Canadians consistently rank environmental issues as a priority. During the energy strategy consultation process, Nova Scotians voiced their concern for the environment, noting that energy production and consumption have environmental impacts on the land, air, and oceans, as well as on human health.

Activities that have a negative impact on the environment are not sustainable. The cumulative effects of decades of industrial growth driven by fossil-fuel energy sources require increased remedial action by governments, businesses, and the general public. Therefore, government has adopted the principle that the focus is not just on protecting, but on improving the environment. Key areas of attention are air emissions resulting from energy production and consumption and the environmental impacts on our oceans from the emerging offshore hydrocarbon sector.

Government Responsibility

While the environment is the responsibility of every individual, policy and regulatory responsibilities rest with the various levels of government and their agencies. The main environmental regulators for Nova Scotia's energy sector are the provincial Department of Environment and Labour and a number of federal government agencies, including Environment Canada, the Fisheries and Oceans Canada, and the Canadian Environmental Assessment Agency. As well, many offshore responsibilities are jointly administered by the Canada–Nova Scotia Offshore Petroleum Board. A high degree of co-operation and coordination is needed among these agencies.

Objectives

The objectives of the energy strategy with respect to the environment are:

- *to reduce harmful air emissions*
- *to contribute to long-range planning for ocean management*
- *to improve the level of trust, information sharing, and fair issue resolution*

Strategic Actions

Air Pollutants

Government will reduce the emissions of air pollutants in the province by incorporating national standards for air emissions along with timelines for implementing these reductions. This will be done in a manner that is consistent with national and international commitments and the principles of this strategy. Emission reductions will result in improvements to the air quality and to ecosystems in the province.

The environmental plan targets four specific air pollutants: sulphur dioxide (SO_2), nitrogen oxides (NO_x), mercury, and particulate matter. They collectively contribute to acid rain, ground-level ozone, smog, and toxins in ecosystems. Measures taken to reduce these emissions will also result in related reductions of emissions from other harmful substances.

Air Pollutant Reductions

- *Reduce SO_2 emissions by 25 per cent from current levels by 2005. This will be done primarily through fuel-switching by NSPI. The government will work with NSPI and other industry participants to further reduce SO_2 in the longer term to achieve a cumulative reduction goal of 50 per cent by 2010.*
- *Reduce NO_x emissions by 20 per cent below 2000 levels by 2009.*
- *Reduce mercury emissions by 30 per cent below 1995 levels by 2005. This goal will be increased as technologies are introduced and proven capable of further reductions.*
- *Implement national standards for particulates when they have been developed.*

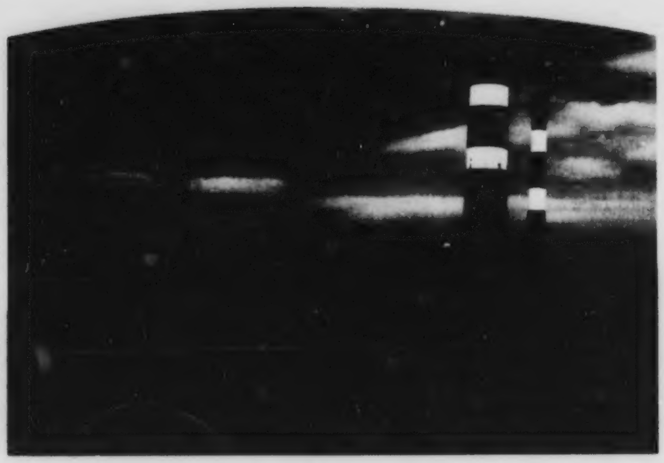

Photo courtesy of the Nova Scotia Petroleum Directorate

NSPI Plant at Strait
Coal-fired electrical generation is one of the principal sources of harmful air emissions in the province.

Nova Scotia generates a high percentage of its electricity from coal-fired thermal generators. These plants constitute one of the principal sources of air pollutants. Opportunities exist to reduce these emissions through various combinations of fuel substitution and the application of technology. Government, NSPI, and other industry participants will work together over the next 10 years on a broad-based plan to significantly reduce the emission of air pollutants. The plan will take into account the need to maintain Nova Scotia's competitive economic position.

Nova Scotia does not have sole responsibility, nor can it act alone, in many areas of environmental management. The federal government has an extensive mandate in this area and a responsibility to develop and enforce national standards. Nova Scotia's environmental performance must be in line with national standards. The province will demonstrate leadership by setting its own standards within the bounds of what might reasonably be anticipated.

Climate Change

Greenhouse gas (GHG) emissions, primarily CO_2 and methane, are now widely accepted as a cause of global climate change. Unless preventive action is taken, the increasing concentration of these gases in the atmosphere is expected to produce a continued warming of the Earth's atmosphere to dangerous levels. More than 92 per cent of Nova Scotia's GHG emissions are created by fossil fuel production, distribution, and consumption. The three largest contributors are electricity generation (38 per cent), transportation (27 per cent), and industrial activity (10 per cent).

Climate change is a global issue, and the federal government, in partnership with the provinces and territories, is leading Canada's response. To date, the key action is the 1997 Kyoto Protocol on climate change. If it is ratified by the federal government, Canada will be required to make reductions in GHG emissions during the period 2008—12 to 6 per cent below 1990 levels. A national process to assess the opportunities and costs associated with such action has been under way since 1998 and is well advanced. The federal government and all provinces and territories have agreed to a National Implementation Strategy (NIS) for greenhouse gas reductions.

Most provinces, as well as the federal government, have produced action plans to begin GHG reductions. In 1999, the Nova Scotia government consulted widely on the issue with the objective of producing a strategic plan for climate change. This process is incorporated within the energy strategy.

The document that resulted from the climate change consultations, *Creating a Nova Scotia Climate Change Strategy Framework*, forms part of the Energy Strategy (see the background papers in Volume II). It includes a series of low-cost first steps to reduce GHG emissions that focus on public awareness and education; government's leading by example through reducing emissions from government-owned buildings and vehicles; transportation and land-use planning; the promotion and sponsorship of research and development on new technologies; and practices to increase energy efficiency and to generate clean energy.

Photo courtesy of the Government of Nova Scotia

Renovation of Johnson Building
Increasing energy efficiency through building renovations is one way the government is helping to improve the environment.

It is recognized that national mandates to reduce GHG emissions will have a greater impact on some jurisdictions than others. Because we depend on coal-fired electrical generation, the negative impacts on Nova Scotia's economy could exceed those of some other provinces. Therefore, it is important that Nova Scotia continue to negotiate an equitable sharing of the costs to meet any new national standards.

Ocean and Habitat Environmental Risks

If not properly managed, energy sector activities can have a negative impact on the marine ecosystem. It is important that a partnership approach be taken by the fishing industry, coastal communities, the petroleum industry, and provincial and federal governments to properly manage our oceans and marine habitat.

Nova Scotia adopts the principle that oil and gas and fisheries activities will be carried out in a manner that allows each industry to prosper and positively contribute to the social and economic well-being of the province and its coastal communities. Meeting this goal requires actions that more effectively manage and protect the ocean environment.

A key step in avoiding conflict among those who depend on the ocean's resources is achieving a clear mutual understanding of where overlaps in interest may occur. The province will support an accelerated plan to identify and map areas of commercial importance and sensitivity. This action, with input from Fisheries and Oceans Canada and other relevant federal departments and agencies, will help create long-term certainty and appropriate environmental standards for Nova Scotia's offshore.

> **"The fisheries should have an opportunity to identify the sensitive areas and have them listed as last resorts for oil and gas development."**
>
> — *Yarmouth Public Meeting*

The government also plans to enhance consultation efforts with the fishing industry and coastal communities. As a first step, it is the government's policy that the CNSOPB will undertake public consultation before exploration rights are issued in areas within sight of Cape Breton Island and mainland Nova Scotia (18km).

To achieve effective ocean and environmental goals, the province will support the development of a limited number of offshore utility corridors in areas where petroleum is developed, produced, or brought ashore. Government's position to the energy industry is that all ocean utilities, including pipelines and cables, will be required to use these corridors.

The government also plans to consult annually with fishery groups to discuss issues of oil and gas policy. These meetings will allow the government to discuss expected oil and gas activity for the year, including general areas for future exploration bids. The government supports efforts by the regulator and the industry to share information, build trust, and solve issues.

Efficiency, Conservation and Renewable Energy Sources

Nova Scotia can reduce the environmental impact of energy use by conserving energy, using resources more efficiently and wisely, and moving toward increased use of renewable energy sources.

On a per capita basis, Canadians and Nova Scotians are large energy consumers compared to those in other jurisdictions. Conserving energy is a cost-effective alternative to finding new energy sources. Making significant gains in energy efficiency depends to a large extent on consumers making energy-efficient choices. Public education is a key factor in this. The province will support programs to promote improved energy efficiency in residential, commercial, industrial, and transportation sectors.

The government will show leadership in the operation of its buildings and fleets by making energy-efficient choices during purchasing and construction. It will also take steps to maximize the energy efficiency of its existing buildings through retrofits by private-sector energy service companies in keeping with the strategy principles.

Reducing the demand for electrical energy will reduce emissions from electricity generation. Using the UARB regulatory process, government will encourage NSPI to develop programs that focus on reducing peak electricity demands. These programs make energy production more efficient by giving consumers incentives to switch their loads to off-peak times of the day, which serves to smooth out the demand for electricity. Efficiencies can also be gained by making use of heat produced in electrical co-generation facilities.

The increased use of renewable energy sources, including wind and solar, will also improve the environment. Each increase in renewable energy produces a corresponding decrease in the use of fossil fuels. Government will take action to encourage the development and increased use of renewable energy sources.

Coal and its Role in Environmental Performance

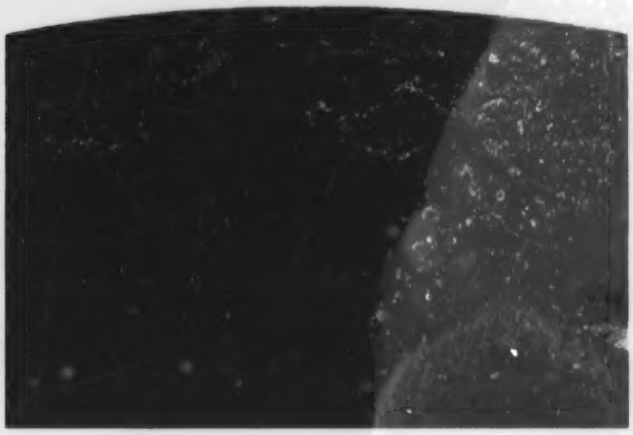

Photo courtesy of the Nova Scotia Petroleum Directorate

Coal
The province will aim to reduce the emission of greenhouse gases and air contaminants produced by the burning of coal.

The use of cleaner coal and increased use of clean-coal technology will help the province meet objectives for climate change and reduce emissions of air contaminants.

Technologies that reduce some air emissions from burning coal are currently available, and clean-coal technology is the focus of global research and development efforts. Any future construction of coal generating capacity in the province will depend on the availability of economically feasible clean-coal technology.

The province will encourage and support research and development related to clean-coal technologies focused on both air pollutants and GHG. It will work with NSPI, Nova Scotia universities, the federal government, and other organizations to identify appropriate research and development activities. It will consider the introduction of research and development incentives for clean-coal technologies.

SECURING OUR FUTURE

An important underlying thrust of the energy strategy is that Nova Scotia's energy resources provide a natural economic advantage for developing both domestic and export energy markets. An important challenge is to convert this advantage into economic, social, and environmental benefits that help secure the future for all Nova Scotians.

Most experts agree that at some time in this century, technological advances in energy storage and production will result in renewable energy sources overtaking non-renewable sources as the dominant fuels. Accordingly, the energy strategy recognizes our non-renewable resources as a "bridge to the future," a window of opportunity to make the transition.

Strategic Actions

The major driver of our energy future is the discovery and development of offshore oil and natural gas—and the belief that there are larger discoveries to come. Once additional resources are discovered and development reaches a critical mass, existing and new businesses will grow more rapidly. This has been the experience in North American petroleum centres such as Houston and Calgary. These centres currently provide a number of support services to the east coast offshore industry.

As stated during the Premier's Energy Forum, we must have a clear plan for how we wish to develop our energy sector. This plan begins with a co-operative approach between governments and industry. Government's main responsibility is to create

Photo courtesy of Ocean Resources, Halifax, Nova Scotia

Supply Vessel Construction
The Atlantic Eagle supply vessel in the final stages of construction at the Halifax Shipyard.

ACTIONS – ECONOMIC GROWTH

Energy development will lead to broad-based economic growth. The government will take positive action to ensure that a meaningful portion of net revenue royalties are used for the long-term benefit of current and future generations.

- *Ensure that Nova Scotia's geographic and resource advantages are enhanced by a strong business climate, including a competitive tax system.*
- *Use conservative budget principles to minimize dependence on volatile resource revenues.*
- *Identify the expenditure of resource revenues so that Nova Scotians understand the benefits being received.*
- *Support research and development into renewable energy sources to prepare for the time when hydrocarbon resources are no longer economic.*
- *Develop energy-specific promotional tools to attract investment.*
- *Create a new Department of Energy to implement and manage the province's energy policies and programs.*

Longer Term
- *Establish a Nova Scotia Offshore Heritage Trust and allocate to it a meaningful portion of net royalty revenues.*

and sustain an environment in which its energy resources can be economically developed and used in a socially and environmentally responsible manner.

To secure Nova Scotia's energy future the government will maintain a competitive taxation system, increase research and development, coordinate the energy strategy with the province's recently developed economic growth strategy, and create a new Department of Energy to execute the new Energy Strategy.

Competitive Taxation

A competitive business climate and tax regime is based upon principles of equity, efficiency, and effectiveness. It sets the stage for business enterprises to make the kind of large scale, long-term capital investments required by a growing energy industry. It also sets the stage for widespread economic spin-offs and sustained economic growth for the benefit of all Nova Scotians.

New energy sources and developments present new opportunities and challenges for the province's tax system. The system must be reviewed regularly to ensure it remains competitive. The energy strategy concludes that Nova Scotia is in a strong competitive position, and no broad industry-wide tax changes or incentives are required. It also confirms the present generic royalty regime as an important part of the effort to encourage exploration.

However, the province recognizes that certain energy sectors, such as renewable energy, research and development, efficiency and conservation, and clean-coal technology, may need incentives. Therefore, the province will seek opportunities, using its existing incentive programs, to work with the federal government, universities and industry to support new energy investments.

Municipal assessment and taxation policy is an area of increasing importance for a growing capital-intensive industry such as energy. The existing policy to exempt industrial machinery and equipment will be maintained and interpreted consistently to encourage capital-intensive development. The definition of property for assessment purposes will be consistently and equitably applied, and business occupancy and capital taxes will be applied uniformly within and across industrial sectors and companies.

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NSPI, the major electrical utility in Nova Scotia, pays grants in lieu of property taxes based on a formula related to electrical use in the various municipalities. This policy was developed at a time when the utility was a Crown corporation. Governments and their agencies are not usually subject to property taxation in the same way as the private sector. In the future the method of property taxation will be reviewed for all energy utilities. As competition for electrical generation emerges, the current method of utility taxation may no longer be appropriate. The review will take into account that electricity is an essential service and that an increase in taxation of regulated assets is passed on to electrical consumers through higher prices.

Budgeting for the Future

Two important characteristics of offshore revenues are price volatility and limited duration. Historically, oil and gas prices and revenues have varied widely due to the cyclical nature of the industry. A number of countries now face significant challenges as their non-renewable resources are depleted and their large royalty revenues are expected to decline. For these reasons, the province will adopt conservative budgeting policies that reflect the volatile and, ultimately, temporary nature of oil and gas prices and revenues.

Monthly Natural Gas Prices at Goldboro, NS *(US$)*

	Average Spot Price
November 2000	4.42
December 2001	7.97
January 2001	7.52
February 2001	4.74
March 2001	4.34
April 2001	4.31
May 2001	3.17
June 2001	2.65
July 2001	1.92
August 2001	1.90
September 2001	1.12
October 2001	1.38

Source: Daily Oil Bulletin price at Dracut, Massachusetts, less M&NP toll

Alberta Oil and Gas Resource Revenues, 1996–2002 *($ Millions)*

1996/97	1997/98	1998/99	1999/00	2000/01	2001/02
4,151	3,909	2,480	4,784	10,842	6,219

Nova Scotia government policy will be to use revenues from offshore resources in ways that improve the long-term economic and fiscal condition of the province. Government will report annually to Nova Scotians on how it spends its offshore revenues.

"Consider establishing a fund from the royalties, like the Alberta Heritage Fund."

— Middleton Public Meeting

Once offshore royalties become "net" royalty revenues (net royalties based on a percentage of producers cash flow (20–35 per cent) after cash expenditures), the province will establish a Nova Scotia Offshore Heritage Trust for the benefit of future generations. The Heritage Trust will receive and manage a meaningful portion of these revenues so that Nova Scotians, today and in the future, benefit from these non-renewable resources.

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Research and Development

Research and development are needed in all phases of the energy industry. Research and development can find ways to add value to the energy resource, enhance production, and conversion technologies, increase production and end-use efficiency, and mitigate environmental impacts. An important goal for the energy strategy is to harness existing research and development capacity in Nova Scotia, such as the new industry-government funded Atlantic Canada Petroleum Institute (ACPI), to support the growing energy sector. ACPI is currently researching topics in areas such as worldwide exploration rights practices and deepwater technologies.

Nova Scotia has a significant research and development community. Federal research funding per capita in Nova Scotia is relatively high, reflecting in part the large number of universities and research laboratories.

A successful R&D strategy requires a vibrant private sector research and development infrastructure. A well-financed private sector can be an active partner in publicly funded efforts, helping the province's researchers gain access to financing from the federal government. Efforts to draw worldwide research money to Nova Scotia will have the benefit of increasing economic activity and improving our capacity for innovation.

The energy strategy supports incentives to increase private sector energy research investment in Nova Scotia. Areas that warrant emphasis include:

- *renewable energy research and development*
- *energy conservation and efficiency technologies*
- *deepwater technologies and operations*
- *east coast offshore petroleum operations*
- *clean-coal technology*

As a follow-up to its successful Energy Forum, Open to the World, in June 2000, the province will host an Energy R&D Forum in 2002 to examine the research community's interests and industry requirements.

Energy and Our Economic Growth Strategy

Oil and Gas Training at the Nova Scotia Community College
Students acquire sophisticated technical skills and training at the Nova Scotia Community College – Marconi Campus.

Photo courtesy of the Nova Scotia Community College, Cape Breton, Nova Scotia

In 2000 the government published *Opportunities for Prosperity: A New Growth Strategy for Nova Scotians.* The strategic directions set by the energy strategy are consistent with the economic growth strategy. They are both focused on improving the business climate, promoting innovation, developing labour force skills, attracting new investment, promoting exports, and strengthening regional capacity to advance economic development. The energy strategy achieves one of the economic growth strategy's goals by creating a plan to develop and use Nova Scotia's energy resources.

To help investors understand the Nova Scotia Advantage, government will support marketing efforts to package all provincial tax and support programs that are available in the energy sector. Working with the Departments of Economic Development and Finance, the new Department of Energy will develop energy-specific promotional tools and bundle existing tax programs and incentives into a Nova Scotia Energy Industry Growth Program.

Department of Energy

The consultation process for the energy strategy received frequent and consistent feedback on the need for a well-resourced energy department with access to the best professional advice possible. "It should have clear and focused responsibilities, and a strong Cabinet voice." This advice came from individuals, fishing organizations, and environmental groups, as well as small and large energy companies and organizations.

Government will create a new Department of Energy. The department's major functions will include oil and gas, electricity, energy utilization, energy research and development, energy economics and policy, and related support services.

The new Department of Energy will have prime responsibility for implementing and managing the province's energy policies and for obtaining the best possible mixture of economic, social, and environmental value from the energy sector.

The new department will also provide leadership and be responsible for interdepartmental co-operation and coordination of energy policies and programs. It will have prime responsibility to coordinate provincial and federal governmental energy activities and relationships with government organizations, advisory groups, regulators, and associations.

The Department of Energy will be outward looking and have as one of its priority goals the development of highly trained and professional human resources in oil and gas, electricity, renewable energy, energy research and development, and energy economics. The performance of this department will be measured by how well Nova Scotia delivers on the stewardship of its energy resources and the long-term returns achieved for the economy and society generally.

The detailed operating plans for the new Department of Energy will be completed in concert with the province's 2002–03 budget process. The new department will begin operating at the start of the new fiscal year and will focus on maximizing for Nova Scotians the economic, social, and environmental benefits from our energy sector.

IMPLEMENTING NOVA SCOTIA'S ENERGY STRATEGY

Photo courtesy of the Nova Scotia Petroleum Directorate

Sunrise Erik Raude A new era in Nova Scotia's industry is on the horizon.

Nova Scotia's new energy strategy is an important first step on the road to developing the energy industry's potential to benefit the province. It sets realistic expectations for the energy sector.

The strategy identifies important elements of a competitive energy market. It ensures that the environment is improved. It provides guidance on how to encourage cross-industry alliances and partnerships among the fishing industry, energy sector, and other communities. It also describes the importance of equitable and competitive taxation, royalty, and economic incentives.

The energy strategy promotes the wise use of energy and confirms the belief that the private sector is the prime engine for developing the province's natural resources and creating economic benefits and long-term growth.

A strategy is excellent only if it is executed exceptionally well. To execute the objectives and actions outlined in this strategy requires a well-defined organizational structure, sufficient professional resources, an agreed-upon scope of responsibilities, and a realistic implementation plan.

The new Department of Energy will work with other government departments, the industry, and all Nova Scotians to implement the energy strategy and seize the opportunities presented by our growing energy industry.

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PART III	Electricity
PART IV	Renewable Energy Sources
PART V	Coal
PART VI	Environment 1. Climate Change 2. Air Pollutants
PART VII	Energy Efficiency 1. Conservation and Efficiency 2. Transportation
PART VIII	Aboriginals and the Energy Sector
PART IX	Research and Development
PART X	Energy Fiscal and Taxation Policy
PART XI	Consolidated Strategy Objectives and Actions
PART XII	Glossary of Terms

Volume II is also available on the Internet at **www.gov.ns.ca/energystrategy**

PROVINCE OF NOVA SCOTIA MEMBERS OF EXECUTIVE COUNCIL

As of December 12, 2001

HONOURABLE JOHN F. HAMM

- *Premier*
- *President of the Executive Council*
- *Minister of Intergovernmental Affairs*

HONOURABLE RONALD S. RUSSELL

- *Minister of Transportation and Public Works*
- *Minister of the Public Service Commission*
- *Chair of Treasury and Policy Board*
- *Minister responsible for Communications Nova Scotia*

HONOURABLE NEIL J. LEBLANC

- *Minister of Finance*
- *Minister responsible for the supervision and management of Part I of the Gaming Control Act*
- *Minister assigned responsibility for reporting on Acadian Affairs*
- *Minister assigned administration of all affairs and matters relating to Nova Scotia Resources Limited*

HONOURABLE ERNEST L. FAGE

- *Minister of Natural Resources*
- *Minister of Agriculture and Fisheries*

HONOURABLE GORDON D. BALSER

- *Minister of Economic Development*
- *Minister responsible for the Petroleum Directorate*
- *Minister responsible for the Business Development Corporation Act*
- *Minister responsible for the Innovation Corporation Act*
- *Minister assigned all affairs and matters relating to the Sydney Steel Corporation Act*

HONOURABLE MICHAEL G. BAKER, Q.C.

- *Attorney General and Minister of Justice*
- *Minister charged with the administration of the Human Rights Act*
- *Minister assigned the administration of the Regulations Act*
- *Minister responsible for the supervision and management of Part II of the Workers' Compensation Act*
- *Minister responsible for Aboriginal Affairs*

HONOURABLE JAMIE A. MUIR

- *Minister of Health*
- *Chair of the Senior Citizens' Secretariat*
- *Minister assigned the administration of the Emergency Measures Act*

HONOURABLE PETER G. CHRISTIE

- *Minister of Community Services*
- *Minister responsible for reporting on the Disabled Persons' Commission Act*

HONOURABLE JANE S. PURVES

- *Minister of Education*
- *Minister assigned responsibility for the Technology and Science Secretariat*
- *Minister charged with the administration of the Advisory Council on the Status of Women Act*
- *Minister charged with the administration of the Youth Secretariat Act*

HONOURABLE RODNEY J. MACDONALD

- *Minister of Tourism and Culture*
- *Minister charged with the administration of the Heritage Property Act*
- *Minister assigned the supervision of the administration of the Nova Scotia Liquor Corporation*
- *Minister assigned the responsibility for the Nova Scotia Sport and Recreation Commission*

HONOURABLE ANGUS MACISAAC

- *Minister of Service Nova Scotia and Municipal Relations*
- *Minister responsible for the Residential Tenancies Act*

HONOURABLE DAVID M. MORSE

- *Minister of Environment and Labour*
- *Minister responsible for the Workers' Compensation Act (except part II)*
- *Minister assigned the administration of Part II of the Gaming Control Act*
- *Minister assigned responsibility for the Utility and Review Board Act*

The above does not represent all Ministerial responsibilities.

Some Ministerial responsibilities that are prescribed by Statute are not set out above.

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Seizing the Opportunity

Volume 2

Nova Scotia's Energy Strategy

NOVA SCOTIA

Nova Scotia's Energy Strategy, Volume II

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3. Benefits from Offshore Resources
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7. Effective and Efficient Regulation

Part III Electricity

Part IV Renewable Energy Sources

Part V Coal

Part VI Environment
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2. Air Pollutants

Part VII Energy Efficiency
1. Conservation and Efficiency
2. Transportation

Part VIII Aboriginals and the Energy Sector

Part IX Research and Development

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Part I Introduction

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Introduction

"You build diversification by starting with the resource, adding value, then looking to opportunities in technology. You need to start with the resource advantages."

-Honourable Peter Lougheed, former Premier of Alberta and one of Canada's most respected leaders. He was Co-chair of the Premier's Energy Forum "Open to the World", held in Halifax in June, 2001.

The Nova Scotia Energy Strategy in Context

Energy plays an important role in all of our lives. Nova Scotia's economy and quality of life in the years to come will be significantly influenced by how wisely and efficiently we use our energy resources, and how diligently we plan for our energy future. The Nova Scotia energy strategy will play an important role in helping us achieve the province's vision of being the best place in the world to live, work and raise a family. To realize our vision, we need a plan that will provide the tools to manage the opportunities and face the challenges that await us.

The Nova Scotia energy strategy provides direction for all aspects of our energy sector. It is a framework of short- and long-term objectives to guide our decision making. The result is a roadmap to a future in which energy resources are major contributors to the prosperity and quality of life of all Nova Scotians.

As we plan for the future, it is useful to briefly review our present situation. This section, which introduces Volume II, provides a brief overview of Nova Scotia's energy sector, where energy is used in our province, and how it is supplied. It also includes a summary of some of the changes in our overall energy picture that are likely to result from the discovery and development of hydrocarbons in our offshore areas, and of some of the important challenges the energy sector will face in the coming years.

Energy Opportunities in Nova Scotia

Current Energy Use

Nova Scotia's primary energy demand is predominantly satisfied at present by burning oil and coal (Figure 1). The predominance of oil as a fuel for primary energy demand reflects the fact that most of the energy used in Nova Scotia goes to operate our cars, trucks, trains, boats, and planes and, to a lesser extent, to heat our homes. To meet this demand, we use a wide range of fuels refined mainly in eastern Canada from imported oil. Coal has an important role in satisfying our primary energy demand because 70-80% of our electricity is currently generated from coal. Until very recently, this demand was satisfied using Nova Scotia coal. However, with the recent closure of the underground coal mines in Cape Breton, the province relies increasingly on imported coal for electricity generation.

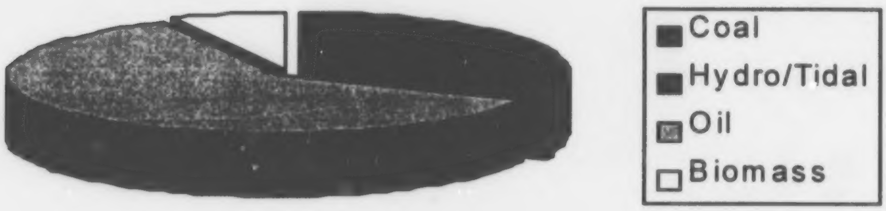

Figure 1. Nova Scotia's primary energy demand by fuel, 1999 (Data source, Statistics Canada, biomass estimated by Department of Natural Resources).

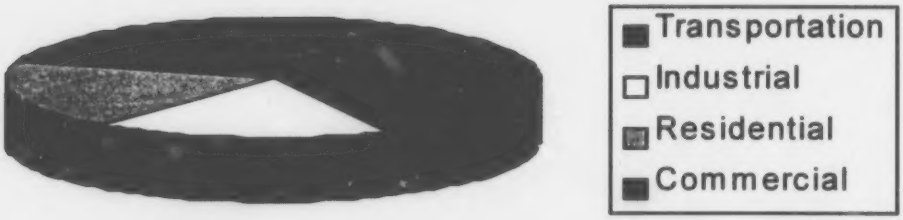

Figure 2. Nova Scotia end-use energy demand by sector, 1999 (Statistics Canada).

Biomass (wood and wood waste) meets an important component of primary energy demand, particularly in rural Nova Scotia. This demand reflects home heating requirements, a 25MW biomass electrical generation facility on the south shore, and the use of wood fuel for heating and drying in a number of commercial operations. The contribution made by wood is difficult to estimate because of the large number of individual users for whom there is no systematic collection of end use data.

Primary energy supply also includes a number of small hydro projects throughout the province and a tidal power plant at Annapolis Royal. Although not reflected in the primary energy demand figures for 1999, from 2001 onwards natural gas is playing an increasingly important role, for example in electricity generation at the Tufts Cove generating facility. This role is expected to increase in the coming years.

Given the widespread use of motorized transport to move goods and people in Nova Scotia, it is no surprise that transportation is the largest component, approximately 43%, of our end use energy demand. The bulk of this is in private light vehicles. The balance of end use demand is shared almost equally by the industrial (18%), commercial (19%), and residential (20%) sectors (Figure 2).

Looking Ahead

To the extent that motorized vehicles continue to dominate our transportation needs, oil will be a major factor in our energy mix. Likewise, given our current dependence on coal for electricity generation, coupled with the cost advantages of coal as a fuel and the potential costs of premature retirement of the province's coal generation facilities, it is expected that coal will remain a significant factor in meeting our electricity demand.

Future energy demand in Nova Scotia will increasingly be met by the use of renewable energy sources. At present, small hydro, tidal and biomass provide a relatively small renewable component to Nova Scotia's energy mix. However, there is significant potential for the development of other renewable energy in the province. Wind presents the best opportunity for new, renewable, utility-scale generation, particularly as the technology is becoming increasingly reliable and cost-competitive with other sources. Although there is no commercial-scale wind generation in the province at present, Nova Scotia Power Inc. (NSPI) has announced that it intends to build 1.3 MW of wind-generated capacity, and in response to a request for proposals, has received proposals from independent power producers for an additional 50 MW. The energy strategy contains measures to encourage additional renewable power generation and continued developments in this field could potentially result in more than 100 MW in total wind powered electricity generation in Nova Scotia in this decade.

Major changes in Nova Scotia's energy mix are likely to take place in the near future, tied to the discovery of hydrocarbons in the offshore area. Production in 2001 of natural gas from the Sable Offshore Energy Project (SOEP) has for the first time made Nova Scotia a net energy exporter. If further natural gas and/or oil discoveries result from the current round of deepwater exploration, Nova Scotia's energy picture will continue to change dramatically. New offshore projects would set the stage for new industrial developments, and offer opportunities for exporting the surplus.

Most forecasters project an increase in renewable energy use in North America over the next several decades, and technological breakthroughs are expected to move the world into a post-hydrocarbon era sometime within the next 30 to 50 years. Accordingly, the development of Nova Scotia's offshore resources comes at a critical time, while these resources have high value and before we make the transition from non-renewable to renewable energy sources.

The Potential for Natural Gas

Raw gas production from the Sable Offshore Energy Project (SOEP) is 500-600 MMcfd (million cubic feet per day). Development of the PanCanadian Deep Panuke project is expected to add 400 MMcfd for a total of 1bcfd (billion cubic feet per day). Additional discoveries in shallow or deep water, and subsequent developments, could potentially increase production by the end of this decade to as much as 2-2.5 bcfd. The Newfoundland Grand Banks also have extensive natural gas reserves which might be brought into production and linked to a Nova Scotia-Canada-northeastern United States gas distribution system.

Nova Scotia Power Inc., StoraEnso, Canadian Gypsum Corp., and the SOEP fractionation plant currently have contracts for approximately 74 MMcfd (77,000 MMBtu/d) of gas supply and pipeline transportation. Potential markets in Nova Scotia for natural gas include residential, commercial, and light industrial use through a gas distribution system, heavy industry, and electricity generation to meet load growth requirements. In addition to Nova Scotia's existing energy users, there are potential opportunities for new industries using natural gas and natural gas liquids in relatively large volumes, such as export electricity generation, petrochemicals production and manufacturing, and aluminium smelting. Even with an optimistic outlook, it is unlikely that gas use in Nova Scotia could exceed 400 MMcfd by 2010. Given the fact that SOEP production alone is greater than 400 MMcf/d, it is clear that Nova Scotia's surplus of natural gas will continue for the foreseeable future.

Given Nova Scotia's proximity to the strongest natural gas market in the world, its projected surplus is a significant strength. Nova Scotia is the nearest source of natural gas for New England, New York, New Jersey, New Brunswick, Quebec and Ontario. This transportation advantage brings high value to the energy resource and makes encourages private sector investment in exploration and development more likely. In a world that is paying increased attention to security, especially since September 11, 2001, Nova Scotia's position as a nearby and reliable supplier of energy to northeastern North America is an important strategic advantage.

The backdrop for the oil and gas sector in Nova Scotia's energy strategy is one of strong market opportunities that drive new investments—investments that will establish our potential and set the stage for new projects. The energy strategy focuses on making the discoveries, pursuing the associated economic and financial benefits, expanding the use of gas in Nova Scotia, and exporting the surplus.

Challenges Facing Nova Scotia's Energy Sector

Notwithstanding the promise of offshore gas and oil, the energy sector in Nova Scotia faces significant challenges. The following are not intended to be exhaustive, but rather illustrative of the challenges that will be faced in the near future, and in the longer term, as we continue to plan and provide for the province's energy future.

Electricity

Nova Scotians have enjoyed relatively stable electricity prices in recent years and our vertically-integrated, regulated utility currently offers among the lowest rates northeastern North America. However, NSPI is currently under pressure from higher fuel costs, particularly world coal prices, a declining Canadian dollar, and expected increases in corporate income taxes. Globally there is a trend to increasing competition in the industry, and increasing integration of the North American electricity marketplace. Government will ensure that we are positioned to take advantage of any benefits from increasing competition, while protecting our competitive advantage in electricity prices.

Coal

Nova Scotia still depends largely on coal as a source of electricity. In the short run, that is an advantage because coal is competitively priced. In the longer term, rising environmental standards will create significant challenges with respect to the air emissions of coal-burning facilities. Meeting these challenges may include development and application of clean coal technologies or a move to cleaner fuel sources.

Offshore Oil and Gas

Nova Scotia production of oil and gas is a relatively new development that faces significant challenges. The Nova Scotia offshore area is subject to very severe weather conditions, especially in the winter. There are long-established marine interests that need to be understood and addressed. Activities are regulated extensively by two levels of government and are subject to strict and expensive environmental and safety requirements. The geological potential of the offshore is thought to be high, but this has yet to be demonstrated by new discoveries. More projects are needed to support a large and diversified service sector with multiple competitors.

As a relatively new player on the national and international hydrocarbon scene, Nova Scotia needs to develop policies and programs that provide a competitive business climate, to encourage needed investment and allow the province to achieve maximum benefit from its offshore resources.

Onshore Oil and Gas

Nova Scotia has identified onshore petroleum potential but there have been no significant discoveries in the province to date. The infrastructure to deliver onshore natural gas discoveries is now in place.

Exploration interest is increasing and coalbed methane developments are also a possibility. Continuing exploration work is required to prove this potential.

Renewable Energy

Nova Scotia currently produces about 8% of its electricity from renewable sources including hydro. Increasing the amount of renewable energy in our portfolio will have environmental benefits, and will help position the province for a future in which reliance on fossil fuel sources will inevitably decrease. The challenge is to properly assess the province's wind resource, and find ways to encourage the development and use of an energy source that, while increasingly so, is not yet fully cost-competitive with traditional large scale electrical generation.

Conservation

Efficient use and conservation of energy equates to a cost-efficient source of new supply and has important environmental benefits. Government is challenged to demonstrate leadership in efficient and wise use of energy. The challenge of other energy consumers is to make wise energy choices.

Structure of the Energy Strategy Report

Nova Scotians look forward to renewed economic growth, increased opportunities, and an enhanced quality of life arising in part from the development of the province's energy sector. In order for this vision to be achieved we will have to seize the opportunities as they occur. Opportunities need to be identified and plans developed for their active pursuit; this is one of the principal functions of the energy strategy.

Strategy development involves making choices about where we want to go and how we want to get there. Volume I of the energy strategy presents an integrated description and action plan of the important strategic directions that government has chosen to guide our future energy decision making.

It is important that the energy strategy provide some in depth information and analysis concerning the province's energy direction, so Nova Scotians and interested stakeholders will be able to understand how the information was used to arrive at the actions chosen. This is the function of Volume II.

Volume II provides a series of background papers that cover the entire range of the strategic process for Nova Scotia's energy strategy. Each background paper covers a topic of importance to our energy future, setting out the principles, strategic objectives and action steps that have been chosen, providing summaries of background information and public advice with respect to these topics, and outlining the analysis that underlies the strategic objectives and the action steps.

The background papers in this volume provide detailed information on various energy sectors, and on Nova Scotia's plan to deal with the challenges and take advantage of the opportunities within these sectors.

Part II

Oil and Gas

1. Offshore Exploration

Seizing the

Opportunity

Volume 2

Nova Scotia's Energy Strategy

NOVA SCOTIA

Part II Oil and Gas

Section 1. Offshore Exploration

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Offshore Exploration

Statement of Principle

Successful development of the offshore oil and gas industry requires more discoveries, which in turn require more information on the resource potential. The first priority is to encourage exploration.

Nova Scotia faces the difficulty of completing an energy strategy not knowing whether the oil and natural gas resources yet to be discovered will be able to support two projects, six projects or even a dozen. The size of future discoveries will have a significant impact on the construction and fabrication requirements, project lifespans, and their profitability. In addition, there is just as much likelihood that deepwater discoveries will be oil rather than natural gas, which has been the predominant resource discovered offshore Nova Scotia to date. The range of possibilities is significant when making decisions today about resource exports, future government revenues, economic growth, shore-based infrastructure, and the industry's lifespan.

To date, more than 6 trillion cubic feet (tcf) of gas have been discovered offshore Nova Scotia. Most of these reserves are already under development with the Sable Offshore Energy Project and the planned Deep Panuke Project. New projects are expected to follow after further discoveries are made. With ready access to markets, reasonable gas prices, a fair royalty and tax regime in place, and public policy and regulatory requirements established, the major uncertainty affecting the timing of future offshore oil and gas development is the pace of discovery of Nova Scotia's offshore potential.

New discoveries require extensive investment in exploration through seismic data acquisition, processing, and analysis, followed by exploratory drilling to confirm the geological assumptions developed from the seismic analysis. Today, Nova Scotia is in the fortunate position of having obtained significant exploration commitments when oil and natural gas prices were strong; producers had cash flow to commit to financing new exploration efforts. With petroleum prices softening at least for the short term, it is important to maintain a favourable investment climate if Nova Scotia is to realize its potential.

Government Role and Responsibility

Resource ownership is vested in the people and developed by the private sector on behalf of the resource owner. The government role is to ensure that the resource potential is accurately assessed; that exploration and development is carried out in a way that benefits both the developers and the owner, while at the same time ensuring the protection of the environment and worker safety; and that the resource is not wasted.

The Canada-Nova Scotia Offshore Petroleum Resources Accord (the Accord), signed in 1986, gives responsibility for management of the Nova Scotia offshore area to both the federal and provincial governments. The Canada-Nova Scotia Offshore Petroleum Resources Accord Implementation Acts (mirror legislation in the Federal Parliament and the Nova Scotia Legislature) gives the federal and provincial ministers responsible for energy key decision-making authority at each step of the way for exploration and development approvals.

These "fundamental decisions" are made by the body that has day-to-day responsibility for regulating the Nova Scotia offshore area, the Canada-Nova Scotia Offshore Petroleum Board (CNSOPB), but the provincial and federal ministers jointly have a veto right. To overturn a CNSOPB fundamental decision, both ministers have to act together. In most cases, the provincial minister has a veto over the project development plan.

Strategy Objective

- To encourage widespread exploration for hydrocarbons in the Nova Scotia offshore area, consistent with environmental and safety objectives.

Actions to Achieve Objectives

2001-2005

- Maintain a stable, predictable, and competitive fiscal system to enable oil and gas explorers to quantify the financial risk and rewards associated with their exploration efforts.
- Maintain the current royalty regime, which encourages exploration efforts in under-explored, higher risk areas.
- Work with groups and processes already established to improve knowledge and understanding of commercially important and environmentally sensitive marine areas (e.g. Eastern Scotian Shelf Integrated Management process and CNSOPB's Fisheries and Environment Advisory Committee).
- Work with the energy and fishing industries, and the federal government, in the process to establish new regulations to implement the extension of the Canadian Environmental Assessment Agency requirements for seismic and drilling activities.
- Using geological and geophysical information gathered in the current round of exploration efforts (50 active exploration licences plus those pending), update the estimate of resource potential in the offshore area.
- Use the latest information on offshore potential to promote the offshore in a variety of forums.
- Consult with coastal communities and fishing interests before issuing exploration rights within sight of Cape Breton and mainland Nova Scotia (18 km).

Events that may Result in Strategy Adjustments

- Once a significant amount of broad exploration effort is completed, examine the rights issuance process with a view to working with the federal government and the CNSOPB to create a system that identifies broad areas for exploration with opportunity for public comment, prior to calling for industry nominations.
- Once a significant amount of broad exploration activity is completed, and once a significant number of projects are established, examine the work-commitment bidding system.

Links to Energy Strategy Themes

Information on the true size of our resource will enable us to more properly assess the pace of development, including an assessment of the longevity of this industry in the province. With this information, Nova Scotia can refine public policy and help **Secure our Future**. Oil and gas industry success in discovering commercial quantities will enable all aspects of the industry to grow and help in **Powering our Economy**.

Background

Offshore Exploration History

Offshore oil and gas exploration began in Nova Scotia in 1967 with drilling of the first well. The first significant natural gas discovery was by Shell off Sable Island at Onodaga in 1969, followed by the first oil discovery in 1971. However, Nova Scotia's first large-scale natural gas discovery did not come until Mobil found the Venture field in 1979. A number of other discoveries were made in the 1980s, but by 1986 falling oil and gas prices put a halt to further exploration. Exploration did not resume until PanCanadian and Nova Scotia Resources Limited started looking for new oil reserves to extend the life of the Cohasst-Panuke Oil Project in the late 1990s. In 1999 PanCanadian discovered natural gas below the Panuke oil field (Deep Panuke).

Current Discovery Status

To date more than 6 tcf of natural gas have been discovered in offshore Nova Scotia. A little more than 100 million barrels of oil have been found.

Nova Scotia Discovery and Potential Context

Nova Scotia's known natural gas discoveries of 6 tcf compare to the UK North Sea discoveries of 77 to 112 tcf, and 123 tcf in Norway. The Geological Survey of Canada (GSC) did an estimate on total natural gas potential in the offshore Scotian Shelf area in 1983. Looking at the geology, the science of the day, and experience up to that time, the GSC estimated an additional 12 tcf of natural gas to be found, for a total discovered and potential of 18 tcf. However, this study did not include the gas potential in George's Bank, the Laurentian Channel, or the deepwater areas on the edge of the continental shelf. Industry estimates - individual companies looking at their own data - suggest there may be double that amount of potential natural gas.

Current Exploration Activities and Commitments

There are currently 50 active exploration licences, and nine more are set to be issued following the most recent bidding round, which closed November 1, 2001. The total work commitment on these licence blocks amounts to more than $1.5 billion. As of the end of 2001, the total number of wells drilled is 180. Details of the current exploration effort may be found in Appendix 1.

The Discoveries are mainly related to the following fields:

Table 1. Discovered In-place Hydrocarbon Resources, Offshore Nova Scotia.

DISCOVERY	OPERATOR	YEAR (Rig Release)	GAS x 10^9m^3 (BCF)	OIL 10^6m^3 (mmbbls)	CONDENSATE-GAS RATIO $m^3/10^3m^3$ (bbls/ mmcf)
1. ALMA F-67	SHELL	1984	15.9 (561)		.073 (13.0)
2. ARCARDIA J-16	MOBIL	1983	1.6 (56)		.027 (4.8)
3. BANQUEREAU C-21	MOBIL	1982	4.0 (140)		.027 (4.9)
4. CHEBUCTO K-90	MOBIL/ SHELL	1984	8.7 (306)		.056 (10.0)
5. CITNALTA I-59	MOBIL	1974	7.1 (250)		.382 (68.0)
6. COHASSET D-42	PAN-CANADIAN	1973		9.1 (57.0)3	
7. GLENELG J-48	SHELL	1983	21.3 (752)		0.39 (6.9)
8. INTREPID L-80	MOBIL/ SHELL	1974	0.8 (30)		.056 (10.0)
9. NORTH TRIUMPH G-43	SOEI	1986	11.8 (417)		.028 (5.0)
10. OLYMPIA A-12	MOBIL	1983	2.3 (80)		.085 (15.1)
11. ONONDAGA E-84[1]	SHELL	1969	5.5 (194)		
12. PANUKE B-90	PAN-CANADIAN	1986		6.7 (42.0)[3]	
13. PRIMROSE N-50	MOBIL/ SHELL	1972	3.5 (125)	0.2 (1.0)	.036 (6.4)
14. SOUTH SABLE B-44	MOBIL	1988	0.3 (9)		.031 (5.6)
15. SOUTH VENTURE O-59	MOBIL	1983	10.3 (364)		.204 (36.4)
16. THEBAUD P-84	SOEI	1972	20.8 (734)		.112 (20.0)
17. UNIACKE G-72	SHELL	1984	1.4 (50)		.032 (5.7)
18. VENTURE D-23	SOEI	1979	58.3 (2059)		.112 (20.0)
19. WEST OLYMPIA O-51	MOBIL	1985	0.7 (25)		.152 (27.0)
20. WEST SABLE E-48	MOBIL	1971	2.3 (79)	1.9 (12)	.180 (32.0)
21. WEST VENTURE C-62	MOBIL	1985	.5 (19)		.027 (4.8)
22. WEST VENTURE N-91[2]	MOBIL	1985	2.3 (82)		
					TOTAL CONDENSATE 10^6m^3 (mmbbls)
TOTAL			**179.4 (6332)**	**17.9 (112)**	**17.7 (111)**

Updated December 2000

[1] Well not flow tested, however, mechanical logs indicate a good reservoir.

[2] Well control problems prevented tests from being run on this well,

[3] Cohasset Project ceased production on December 12, 1999, and recovered a total of 7.1 10^6m^3 (44.5 million barrels of oil).

Note: BCF - billion cubic feet; mmcf - million cubic feet; mmbbls - million barrels

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Note: BCF - billion cubic feet; mmcf - million cubic feet; mmbbls - million barrels

Diversity of Exploration Effort

Of the 59 exploration licences granted and pending, PanCanadian Energy is the operator on 17 blocks, Kerr-McGee is the operator on 7 blocks, and ExxonMobil is the operator on 9 blocks. Each of these companies has very large operations and a variety of offshore interests in many parts of the world.

This dominance by large, well-financed exploration companies is typical of an under-explored basin where each well can cost from $35 million to $60 million, or more. Despite the dominance of several exploration companies, the investment diversity is stronger than it would appear. Few blocks are totally owned by the operator. Behind the operators are a number of investment interests. These investors are able to participate in the risks and rewards without needing the complex experience required of an offshore operator.

In addition, there are a number of smaller interest-holders, such as Corridor Resources, Marico, Canadian Superior, and Richland Minerals. In some cases these companies have played an active role in accumulating licence blocks, doing an initial assessment and then bringing in more experienced companies as partners. For example, Canadian 88 acquired a number of deepwater offshore blocks, promoted the opportunity, and then brought in as a partner the very experienced deepwater operator, Kerr-McGee Offshore Canada Ltd.

Exploration Rights

Encouraging Investment

A number of factors influence industry's interest in the Nova Scotia offshore area. Lands are awarded through a competitive bidding process, as they are in most other offshore areas.

Nova Scotia has a fiscal system that rewards operators who take the biggest offshore risk. The royalty regime is based on project revenues, similar to many other offshore areas of the world. Other factors that contribute to industry's interest in the area include a skilled labour force, local infrastructure, proximity to markets, a stable political climate, streamlining of the regulatory process, and ready access to petroleum geoscience information.

Rights Issuance Process

The current rights issuance process for offshore Nova Scotia is recorded in the Accord legislation and its regulations. The first step in the rights issuance process is industry's nomination to the CNSOPB of offshore lands that it wishes to explore. What generally follows is a posting of these lands by the CNSOPB in a competitive Call for Bids. During the call process, there is opportunity for public comment on the lands, and the CNSOPB will consider public comments before disclosing the name of the high bidder. The CNSOPB makes the decision to award a licence, although the federal and provincial ministers jointly have the opportunity to exercise a veto.

Highest Work Commitment Wins Licence

If a decision is made to award the lands, the companies that bid the highest cash value of work expenditure (commitment) are awarded exclusive exploration rights on the lands, via exploration licences. Companies receiving exploration licences must provide to the CNSOPB a letter of credit, which amounts to 25% of the proposed work expenditure, as a guarantee of work performance. Failure to perform the work as proposed may result in forfeiture of the full 25% deposit.

In other more established and mature offshore basins, lands are generally awarded according to a cash-bonus bidding system. Rather than proposing work expenditures, companies pay for the right to explore. A lump sum payment is made to government for the exclusive right to explore and develop. While there is no guarantee of work performance under this system, the generally successful exploration and development history of the area creates a reasonable expectation that exploration activity will take place.

Environmental Approval Process

Offshore hydrocarbon development projects are subject to the Canadian Environmental Assessment Act (CEAA) process The CNSOPB is a federal authority under CEAA (i.e., the CNSOPB must apply CEAA processes), and a responsible authority under CEAA for oil and gas development activity offshore Nova Scotia.

Over the next year, the CEAA Agency will be making changes to regulations to include exploration activity for oil and natural gas. At that time, the CNSOPB will become a responsible authority under CEAA for exploration activity. This means that any hydrocarbon-related activity in the offshore will not be permitted until such time as an environmental assessment process under CEAA has been carried out and accepted. In summary, no petroleum-related activity is permitted to occur on lands issued without first satisfying stringent environmental requirements.

Public Advice

The energy strategy's public workshops and submissions indicated a need for more information on exploration and development implications for coastal communities, and others who depend upon the oceans. Interested parties sought assurances that the regulatory process would take their concerns into account in decision making. Many submissions also supported the government's objective of obtaining more accurate information on the size and locations of the resource, and the desire to make additional significant discoveries.

Analysis

Nova Scotia an Under-explored Area

Offshore Nova Scotia is believed to have more than 20 trillion cubic feet of natural gas potential. There have been some estimates that the final number could be in excess of 40 tcf. Much of the more than 6 tcf of gas discovered to date is either under development or planned for development. Additional development can occur only after additional hydrocarbon reserves have been discovered and delineated.

Table 2. Number of exploration wells drilled offshore the United Kingdom compared to Nova Scotia.

Year	Nova Scotia	UK (North Sea)
1964-1974	46	336
1975-1984	38	606
1985-1994	20	874
1995	0	60
1996	0	72
1997	0	61
1998	1	47
1999	3	16
2000	3	26
Total	111	2,099

Sources: Department of Trade and Industry, United Kingdom, historical records and Appendix 4 of the *Development of the Oil and Gas Resources of the United Kingdom 2001*; Canada-Nova Scotia Offshore Petroleum Board, *Directory of Wells*; Nova Scotia Petroleum Directorate.

The comparison between Nova Scotia and other offshore areas clearly shows the Nova Scotia offshore area is in its infancy. As an under-explored area, it needs more work both to establish resource potential as a basis for better planning and to actually make the discoveries that will enable more projects to proceed.

Updating Potential

Recent exploration efforts have resulted in a huge increase in seismic data, which have more clearly identified geological structures with potential to contain oil and natural gas reserves. In addition, exploration drilling has enabled explorers to tie the geological data with the prospects and leads indicated on the seismic data. This information is submitted to governments through reports to the Canada-Nova Scotia Offshore Petroleum Board (CNSOPB).

This information, combined with data from the first new-era deepwater wells, will enable the CNSOPB and the Department of Energy to update the estimate of the potential of the Nova Scotia offshore area. This update will better enable government to create public policy dealing with offshore oil and gas activity. An update is expected during 2002.

Encouraging Exploration

Encouraging exploration will help maximize our geological knowledge of the offshore. Measures required to accomplish this goal include stable tax and royalty regimes, a competitive business climate, an efficient and effective regulatory process, and readily accessible markets. For more information on each of these factors see Volume II Part X: Energy Fiscal and Taxation Policies, and Volume II Part II, Section 5: Using Nova Scotia Resources.

Another mechanism for encouraging exploration is to promote the offshore through technical presentations and discussions with investors. With the updated information on Nova Scotia's offshore potential in hand, there is an opportunity to bring in new industry players in future licensing rounds. Although the majority of the prospective offshore area is currently under licence, some blocks could be returned to the Crown as early as 2003. The analytical and promotional capabilities of the Department of Energy will have to be strengthened to help the province achieve its objective of increased exploration effort.

Cash Bonus Bidding

Nova Scotia's rights issuance process, which is based on the commitment made for exploration, works well in the early exploration stages of a basin because it puts scarce investment dollars to work. This supports the province's objective of determining its potential for hydrocarbon production. However, independent analysts have suggested that the cash bonus system creates more efficient economic decision making, and allows the resource owner (the people) to gain a revenue source.

Over time, if significant discoveries are made and Nova Scotia's geological potential is firmly established, Nova Scotia will work with the federal government to review the current practice of issuing rights. This will be considered once geological uncertainties have been reduced, and certainly once commercial discoveries are made outside the Sable Island area. Meanwhile, the government will continue to encourage exploration in the broader offshore area by offering exploration rights to the companies proposing to perform the most work for any given offshore land parcel.

Need to Remain Competitive

Nova Scotia must continue to attract offshore investors. Investment is the necessary precondition for exploration activity, which is needed to determine the potential of our offshore. With new discoveries come development, and the benefits of royalties, taxes, transfer of technology, new industries, supply of local goods and services, fabrication work, and other employment possibilities.

To attract the necessary capital, Nova Scotia recognizes that it must be competitive with other areas competing for the same pool of investment. Many of the major companies operating offshore Nova Scotia have interests in other parts of the world. They compare the company's return on an investment in Nova Scotia with places such as offshore Brazil, Angola, Australia, New Zealand, Gulf of Mexico, or the North Sea. For a more detailed analysis of this issue, see Volume II Part X: Energy Fiscal and Taxation Policy.

Environmental and Fishing Considerations

The statement of principle on exploration notes that encouraging exploration is the first priority, consistent with other principles and objectives. A statement of principles and objectives relevant to the issue of the fishing industry and coastal communities presented in Part II, Section 2: Energy and the Fishery and the Marine Environment.

Bibliography

Canada - Nova Scotia Offshore Petroleum Board. www.cnsopb.ns.ca

www.gov.ns.ca/petro

Appendix 1. Exploration Licences.

EL #	Area (ha)	Operator	$ Amount	Effective Date
2356	74,206	ExxonMobil Canada Properties	86,388,660.00	July 1, 1996
2357	12,996	PanCanadian Energy Corporation	2,313,288.00	July 1, 1997
2358	99,510	PanCanadian Energy Corporation	1,315,000.00	July 1, 1998
2359	300,380	Chevron Canada	66,667,000.00	July 1, 1998
2360	19,759	PanCanadian Energy Corporation	8,291,888.00	July 1, 1998
2361	23,499	ExxonMobil Canada Properties	9,562,950.00	July 1, 1998
2362	5,976	MariCo Oil & Gas Corp.	1,720,000.00	July 1, 1998
2363	104,256	PanCanadian Energy Corporation	2,323,580.00	July 1, 1998
2364	289,610	Hunt Oil Company	2,165,000.00	July 1, 1998
2365	290,860	Hunt Oil Company	2,165,000.00	July 1, 1998
2366	103,000	ExxonMobil Canada Properties	3,256,000.00	January 1, 1999
2367	90,708	PanCanadian Energy Corporation	1,320,756.00	January 1, 1999
2368	247,020	Corridor Resources Inc.	1,052,520.00	July 1, 1999
2369	21,147	ExxonMobil Canada Properties	70,056,110.00	July 1, 1999
2370	11,135	ExxonMobil Canada Properties	10,013,375.00	July 1, 1999
2371	63,184	ExxonMobil Canada Properties	47,030,057.00	July 1, 1999
2372	53,256	ExxonMobil Canada Properties	55,015,185.00	July 1, 1999
2373	38,365	ExxonMobil Canada Properties	7,837,266.00	July 1, 1999
2374	29,840	ExxonMobil Canada Properties	2,005,322.00	July 1, 1999
2375	47,807	Richland Minerals Inc.	1,210,951.31	July 1, 1999
2376	87,145	PanCanadian Energy Corporation	71,623,566.00	July 1, 1999
2377	168,740	Marathon Canada Ltd.	93,256,756.00	July 1, 1999
2378	112,830	Imperial Oil Resources	71,134,815.51	July 1, 1999
2379	112,830	Imperial Oil Resources	28,865,184.49	July 1, 1999
2380	112,830	PanCanadian Energy Corporation	1,239,895.00	July 1, 1999
2381	151,360	Shell Canada Ltd.	23,303,666.00	July 1, 1999
2382	170,580	Shell Canada Ltd.	68,555,664.00	July 1, 1999
2383	75,840	Kerr McGee Offshore Canada Ltd.	5,100,000.00	July 1, 1999
2384	246,955	PanCanadian Energy Corporation	8,155,535.00	July 1, 1999
2385	152,460	Shell Canada Ltd.	2,119,679.00	July 1, 1999
2386	304,920	Kerr McGee Offshore Canada Ltd.	24,888,888.00	July 1, 1999

EL #	Area (ha)	Operator	$ Amount	Effective Date
2387	18,220	PanCanadian Energy Corporation	4,856,746.00	January 1, 2000
2388	39,267	Richland Minerals Inc.	1,620,600.00	January 1, 2000
2389	106,395	PanCanadian Energy Corporation	15,389,712.00	January 1, 2000
2390	169,470	PanCanadian Energy Corporation	8,347,986.00	January 1, 2000
2391	37,740	Richland Minerals Inc.	1,620,600.00	January 1, 2000
2392	106,395	Richland Minerals Inc.	1,620,600.00	January 1, 2000
2393	58,700	Kerr McGee Offshore Canada Ltd.	1,500,000.00	January 1, 2000
2394	114,200	PanCanadian Energy Corporation	1,331,919.00	January 1, 2000
2395	113,590	PanCanadian Energy Corporation	13,279,856.00	January 1, 2000
2396	152,190	Kerr McGee Offshore Canada Ltd.	27,203,000.00	January 1, 2000
2397	305,400	PanCanadian Energy Corporation	4,911,865.00	January 1, 2000
2398	306,880	Kerr McGee Offshore Canada Ltd.	27,203,000.00	January 1, 2001
2399	114,010	Kerr McGee Offshore Canada Ltd.	20,639,000.00	January 1, 2001
2400	25,935	Richland Minerals Inc.	2,110,000.00	January 1, 2001
2401	24,050	Canadian Superior Energy	5,125,800.00	January 1, 2001
2402	20,776	Canadian Superior Energy	27,203,000.00	January 1, 2001
2403	185,580	BP Canada Energy	97,776,000.00	January 1, 2001
2404	296,440	Kerr McGee Offshore Canada Ltd.	13,120,000.00	January 1, 2001
2405	279,990	Richland Minerals Inc.	3,210,000.00	January 1, 2001
2406	288,000	Canadian Superior Energy	41,250,000.00	January 2, 2002
2407	227,200	BEP Co. Canada Company	6,742,000.00	January 2, 2002
2408	55,500	PanCanadian Energy Corporation	10,515,951.00	January 2, 2002
2409	40,734	Canadian Superior Energy	15,510,000.00	January 2, 2002
2410	135,036	Marathon Canada Ltd.	176,694,000.00	January 2, 2002
2411	136,565	Marathon Canada Ltd.	193,624,510.00	January 2, 2002
2412	291,970	Richland Minerals Inc.	4,283,650.00	January 2, 2002
2413	256,755	Richland Minerals Inc.	2,713,650.00	January 2, 2002
2414	148,210	PanCanadian Energy Corporation	75,856,789.00	January 2, 2002
Total Area:	7,678,202	Total Work Expenditure	$1,564,715,791.00	

Part II

Oil and Gas

2. Energy and the Fishery and the Marine Environment

Seizing the Opportunity

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NOVA SCOTIA

Part II Oil and Gas

Section 2. Energy and the Fishery and the Marine Environment

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Energy and the Fishery and the Marine Environment

Statement of Principle

Oil and gas activities and fishing activities will be carried out offshore Nova Scotia in a manner that allows each industry to prosper and positively contribute to the long-term social and economic well-being of the province and its coastal communities.

The oceans and the land beneath are a storehouse of renewable and non-renewable resources that belong to the people. Through careful licensing and regulation, private interests are allowed to catch the fish, trap the crustaceans, harvest the plant life, and extract the oil and gas. If managed carefully and for the general good of all parties, these activities can be carried out with minimal harm to the environment. Consultation and respect for various economic and environmental interests is the foundation for public policy and management.

Coastal communities are special stakeholders in oil and gas activities. This connection is often indirect when it comes to activities far offshore, but even at a distance there is a clear social and economic impact from pipeline landfalls, supply bases, and industrial developments that depend on being close to the energy source.

In the case of activities near shore, the coastal community connection is stronger and more direct. Issues of scenic importance and natural beauty emerge when energy activities are within sight of land. The regulatory process has to take into account the additional economic impacts, including the effect on tourism, in the process of issuing exploration rights and approving activities near shore.

The regulatory process must also take into account the objective of encouraging responsible exploration, the process of discovery through which wealth can be unlocked for the benefit of all Nova Scotians.

Government Role and Responsibility

The federal government has primary responsibility for ocean resources through the Oceans Act and the Fisheries Act. This responsibility includes fisheries resource management and oceans research by the Department of Fisheries and Oceans. Other federal responsibilities arise through application of other legislation such as the Canada Shipping Act, the Navigable Waters Protection Act, and the Canadian Environmental Assessment Act.

International treaties and agreements such as the Convention on Biodiversity, the Jakarta Mandate, the London Dumping Convention, and the United Nations Convention on Law of the Sea also play significant roles.

In addition to the specific federal responsibilities, the governments of Canada and Nova Scotia have co-management responsibilities for oil and gas resource management and development under the Canada-Nova Scotia Offshore Petroleum Resources Accord Implementation Acts.

The province has responsibility for environmental approvals for oil and gas activities in areas of sole provincial jurisdiction, including onshore and in specific bodies of water such as the Minas Basin and Georges Bay. The province is also accountable to the people of Nova Scotia for the overall social, economic, and environmental impacts of industry activities.

Strategy Objectives

- Development of long-range plans for ocean management and usage during exploration and production of oil and gas resources.
- Achievement of a climate of trust, open information sharing, and fair issue resolution between the oil and gas industry, the fishery, and coastal communities.

Actions to Achieve Objectives

2001-2005

- Work with the Department of Fisheries and Oceans, the Canada-Nova Scotia Offshore Petroleum Board (CNSOPB), the fishing industry, and the Canadian Association of Petroleum Producers (CAPP) to identify known areas of fishing activity, their magnitude and importance. Identify important ocean ecosystem factors and areas of sensitivity, such as spawning grounds, migration routes or unique coral reefs.
- Enhance consultation mechanisms between governments, regulators and the industries. As a first step, the provincial Department of Agriculture and Fisheries and the Department of Energy will create a forum for government and the fishing industry to discuss long-term policy issues.
- Support efforts by others to consult on fisheries and oil and gas issues.
- Work with the CNSOPB to establish utility corridors to concentrate pipeline and other underwater utilities to minimize the amount of land used for these activities.
- Establish as a provincial policy that before issuing exploration rights within sight of land on Cape Breton and mainland Nova Scotia (approximately 18 km) there will be special consultation with the fishing industry and coastal communities.
- Work with groups and processes already established to improve knowledge and understanding of commercially important and environmentally sensitive ocean and coastline areas (e.g. Eastern Scotian Shelf Integrated Management process and CNSOPB's Fisheries and Environment Advisory Committee).
- Work with the energy and fishing industries, and the federal government, to participate in the process

to establish new regulations to implement the extension of the Canadian Environmental Assessment Agency requirements for seismic and drilling activities.

Events that may Result in Strategy Adjustments

- Once the current round of exploration activity is complete, the province will support a review of the rights issuance process. The approach to be examined is one where the offshore is divided into specific areas. At any given time, the CNSOPB would identify which areas are open for nomination and give public notice.

Links to Energy Strategy Themes

Building knowledge about areas of potentially overlapping interest and addressing issues of mitigation will enable a renewable industry, the fishery, to continue to prosper and thus help **Secure our Future**. Identifying ecologically sensitive areas and developing plans to avoid damage helps us **Improve our Environment** by identifying areas of overlapping interest earlier and more clearly, the oil and gas industry faces less uncertainty as to what is required when it decides to bid on land offshore Nova Scotia. Thus, more exploration commitments are made, which helps us discover our potential, and **Power our Economy**.

Background

Nova Scotia Context

Oil and gas exploration offshore Nova Scotia has been conducted since the 1960s. Over this 40-year period of activity, there have been many interactions between the fishing industry and the oil and gas industry. The interactions range from brief periods of time (30-90 days for exploratory drilling or 10-40 days for seismic mapping) to years for development projects. In recent years both types of interactions have emerged. Regulation of these activities is done by the joint federal-provincial Canada-Nova Scotia Offshore Petroleum Board (CNSOPB).

Nova Scotia Consultation

The most well-established consultation process to deal with interactions between the two industries is the one that focuses on specific activities. Such an activity-based approach allows for a clear understanding of what is going to happen, where the activity will take place, and how long it will last. This consultation takes place through the environmental assessment process and through the CNSOPB's Fisheries and Environmental Advisory Committee (FEAC).

FEAC has representatives from the fishing industry and other government departments and agencies (e.g. Department of Fisheries and Oceans, Environment Canada, and the Nova Scotia Petroleum Directorate). This committee reviews all activity plans, including licence parcels before a licence is awarded, and all activity plans for seismic or exploratory drilling.

Consultation processes are also specified under the rules and regulations of the Canadian Environmental Assessment Agency. The approaches with respect to application for seismic and drilling activities are currently under review. However, for project development, plans must go through either a comprehensive study or a full panel review. For more information on the exploration licence issuance and consultation process, see CNSOPB web site.

In a more general approach, the Canadian Association of Petroleum Producers (CAPP) and representatives of the fishing industry have held ongoing discussions about general policy issues, including attributable damage (e.g. compensation paid where it is clear a specific oil and gas activity damaged fishing gear). Discussions about non-attributable damage (where no specific act can be identified, but damage has clearly occurred) and long-term cumulative effects from oil and gas activities are continuing. These discussions are taking place within CAPP's Petroleum Fisheries Liason Group.

There is no specific forum for policy consultation between the fishing industry and the federal and provincial policy makers. The provincial Minister of Agriculture and Fisheries has an annual meeting with the fishing industry, but there is no similar forum for the Energy Minister to meet with the fishing industry. There is one fishing industry member of the Premier's Energy Council, but that position is designed to give a fisheries perspective on energy issues. The council is not intended to be a representative consultative forum.

The Cape Breton Public Review

In October 2000 the governments of Canada and Nova Scotia issued a joint directive to the CNSOPB ordering a public review. The review is examining public concerns about proposed exploration activities in three licence blocks offshore Cape Breton that reach the shoreline. Initial meetings in seven Nova Scotia communities gathered information about the concerns. These meetings identified a wide range of concerns by various groups and the general public. Many related to a lack of knowledge or fear that the regulatory approach was insufficient to protect their interest. Further public hearings are planned for January 2002. The review commissioner, Dr. Theresa MacNeil, is required to present her report to the CNSOPB and the government by March 31, 2002.

Integrated Management of Activities in the Marine Environment

The Department of Fisheries and Oceans (DFO) has the mandate for management and conservation of Canadian marine and freshwater aquatic resources and their habitat. DFO is developing an Oceans Strategy and is currently working on an integrated management plan for the eastern Scotian Shelf.

This plan, being developed under the provisions of the Oceans Act, will allow all interests a better understanding of what activities are permitted, and under what conditions. This is a long-term initiative that will offer both the fishing and the energy industries greater certainty when making their plans. Similar plans will eventually be developed for other offshore areas. DFO is also working toward protecting a section of the Nova Scotia offshore area known as "the Gully." Other areas of special marine interest may be identified in the future.

Regional Advisory Process

The DFO mandate requires that technical knowledge and advice be provided to management and regulatory agencies within DFO and elsewhere on the conservation requirements for these resources. The Regional Advisory Process (RAP) was established in 1993 to provide peer-reviewed information on the status of the fisheries and marine mammal resources in the Atlantic zone, and was expanded in 1997 to include the Central & Arctic and Pacific regions.

A key RAP session is being undertaken this fall to describe the Southern Gulf of St. Lawrence and Sydney Bight areas of coastal Cape Breton, and the potential environmental impacts of oil and gas exploration in near-shore marine areas. The information presented will be subject to scientific peer review. Results of this session, as reviewed by the scientists, will be presented to the Cape Breton Public Review.

Activity Mapping and Identification

The CNSOPB has been working with environmental and fishing industry groups and DFO to develop maps of commercially important and environmentally sensitive areas on the Scotian Shelf. DFO has done similar work in the Gulf of St. Lawrence. The RAP session will help gather information for mapping.

Subsea Overlapping Interests

The Sable Offshore Energy Project has created a preferred pipeline route from the offshore to the onshore. PanCanadian, in its proposed Deep Panuke project, is using the same route. The creation of such common corridors acts to minimize the frequency with which the fishing industry would come into contact with obstructions. This is an important issue for draggers. Telecommunications providers have not followed this policy, and there is little coordination in that sector.

Energy and Fisheries/Environmental Research

Environmental Studies Research Fund

The Department of Fisheries and Oceans conducts extensive scientific research on fishing and environment-related matters and impacts. The oil and gas industry is also obliged, under the provisions of the Canada Petroleum Resources Act, to pay an annual levy in support of the Environmental Studies Research Fund (ESRF). This levy supports environmental and social studies pertaining to oil and gas activities on frontier lands in Canada, including offshore Nova Scotia.

Current ESRF research includes several studies of significance for the Nova Scotia offshore area.

- ESRF Report 138, Seabird Attraction to Offshore Platforms and Seabird Monitoring from Offshore Support Vessels and Other Ships (Literature Review and Monitoring Designs). Continuing.

- ESRF Report 139, Proceedings of a Workshop to Develop Methodologies for Conducting Research on the Effects of Seismic Exploration of the Canadian East Coast Fishery, Halifax, Nova Scotia, 7-8 September 2000.
- ESRF Report 140, Identification of Ecologically and Commercially Important Areas in the Southern Gulf of St. Lawrence. Currently underway and not yet published.

ESRF Projects with DFO

The Department of Fisheries and Oceans is undertaking a number of other projects with funding from ESRF. They include modelling studies on the fate and environmental impacts of discharged drilling mud, and efforts to expand knowledge on the distribution, abundance, habitat requirements, and ecological importance of deepwater corals in Atlantic Canada.

ESRF Priorities for 2002

The management board of ESRF established three areas of primary concern, including cumulative effects from oil and gas industry activities, discharges such as waste and drilling mud, and the effects of seismic exploration.

CEAA Extension to the NS Offshore Area

The Canadian Environmental Assessment Act (CEAA) provides for environmental assessments of proposed activities in areas of federal jurisdiction. In 2000 the federal government enacted regulations to designate the CNSOPB as a federal authority under the terms of the act for offshore development activity. The federal government is also developing further regulations for the conduct of environmental assessments for exploration activity in offshore Nova Scotia. The CEAA process requires that the party proposing the activity pays for the cost of the assessment.

Nova Scotia Community Benefits

The Sable Offshore Energy Project has resulted in a number of relatively small but important improvements in the communities directly affected by the landfall of natural gas. For instance, the second quarter 2001 report for Sable Offshore Energy Inc. shows that during that three-month period the company provided funding for the Guysborough Waterfront Development Society, the Mulgrave and Area Lakes Enhancement Association, the Eastern Memorial Hospital, the Goldboro - Isaacs Harbour Community Development Association, and the St. Mary's Tourism Association.

Experience in the North Sea has shown that an offshore oil and gas industry is a significant addition to the safety of those in the fishing industry and other ocean-going vessels. The year-round presence of the drilling and production platforms and standby vessels enables an earlier response to vessels in distress than would otherwise be possible. Platforms can be used as refueling stations, greatly extending the range of search and rescue helicopters. This situation has already occurred in the Nova Scotia offshore area, likely saving several lives.

Analysis

Context

Oil and gas activities are conducted offshore in many areas around the world, and there is a large body of experience with respect to oil and gas and fishing industry interactions. However, the climates and standards of regulatory oversight vary considerably. Nova Scotia views the most applicable experience for oil and gas policy development to be the experience of western democracies in North America and the North Sea (primarily the United Kingdom and Norway).

Comparison with these jurisdictions must be made in the context of the time frame for their exploration, development, and production experience. Offshore production first took place in the United Kingdom and Norway in the early 1970s with single discoveries far greater than that found off the coasts of Nova Scotia or Newfoundland. The size of the discoveries led to immediate development, and further discoveries led to accelerated, massive exploration and many new developments over the following three decades.

The experience in the Gulf of Mexico was similar: early discoveries followed by rapid development, which led to more exploration and development. That level of offshore activity is far higher than anything ever seen off the coast of Nova Scotia.

Table 1. Comparison of offshore energy developments in Norway and Nova Scotia.

Region	Size first oil	Size first gas	Size largest oil	Size largest gas
Norway	Ekofisk, 1969 2 billion bbl	Frigg, 1971 6.6 tcf	Statford, 1973 4 billion bbl	Troll, 1979 46 tcf
Nova Scotia		Onodoaga, 1969 0.25 tcf		Venture, 1979 1-2 tcf

Offshore Nova Scotia, the size of the initial discovery fields has been much smaller and there has been a considerable lag in time between discovery and development. Despite a similar time frame for significant discoveries - the Venture gas field was discovered in 1979 - it wasn't until six separate fields were tied together into one project that the Sable Offshore Energy Project became economic and started producing 27 years after first discovery.

The activity levels in such mature oil and gas basins as the North Sea and the Gulf of Mexico are very significant today. For example, in the summer of 2001, 21 rigs were operating offshore Norway and a similar number were operating off the coast of the United Kingdom. Only two rigs were operating offshore Nova Scotia.

Oceans Management

The Government of Nova Scotia supports DFO's effort to carry out its responsibilities under the terms of

Table 2. Comparison of the number of offshore exploration wells drilled in the UK and Nova Scotia

Year	Nova Scotia	UK (North Sea)
1964 - 1974	46	336
1975 - 1984	38	606
1985 - 1994	20	874
1995	0	60
1996	0	72
1997	0	61
1998	1	47
1999	3	16
2000	3	26
TOTAL	**111**	**2098**

Sources: Department of Trade and Industry United Kingdom, historical records and Appendix 4 of the *Development of the Oil and Gas Resources of the United Kingdom 2001* and
Canada-Nova Scotia Offshore Petroleum Board, *Directory of Wells* and
Nova Scotia Petroleum Directorate

the Oceans Act and intends to be an active partner. In advance of a fully integrated management plan there is value in accurately identifying existing fishing activities and environmentally sensitive areas. At a basic level this information allows the energy industry to make decisions about the degree of difficulty it faces in developing plans for mitigation if it wishes to secure exploration rights.

The province supports efforts by others to accurately identify interests and activities offshore Nova Scotia. It also supports efforts to develop plans for minimizing conflict and achieving sustainable development to enable Nova Scotians to enjoy our marine environment for years to come.

Utility Corridors

In many offshore jurisdictions, such as the United Kingdom and Gulf of Mexico, pipeline routes have developed largely at the discretion of each project developer. Although each route choice undoubtedly met the particular needs of that project, the cumulative effect was to create an extensive network of pipe and a significant barrier for certain types of fishing. Those who have seen the rise in potential conflicts have advised that it would have been better to channel developments into a limited number of corridors. To meet the objective of minimizing conflict between the two industries (as well as other objectives, such as concentrating petrochemical feedstock), the province will ask the CNSOPB to help minimize energy and fishing industry conflict by creating a limited number of utility corridors for pipelines from the offshore to the onshore. The CNSOPB will also be asked to work with Industry Canada and the Nova

Scotia Department of Natural Resources to have the same corridors become the preferred route for undersea telecommunications cables.

CEAA Process for Offshore Environmental Assessments

Environmental considerations are rising, and the province is specifically committed to measures to improve our environment.

Although the magnitude of activity off the coast of Nova Scotia has been relatively small compared to other jurisdictions, such activities have been going on for more than 30 years in one form or another. By the end of 2001, approximately 180 wells of all types (exploration, delineation and development) will have been drilled offshore Nova Scotia, and hundreds of thousands of kilometres of seismic data will have been acquired. In the entire Nova Scotia offshore area, 40 exploration wells are forecast to be drilled over the next four years.

The financial commitment for drilling rigs is very high, with rates reaching $300,000 a day or more. A regulatory process that imposes uncertain or open-ended decision making would likely have a severe and negative impact on many drilling programs and the province's effort to encourage exploration. Accordingly, the appropriate approach is one that most efficiently assesses the likely environmental impacts of most planned offshore activities.

In most offshore areas, seismic data acquisition is a short-term activity that has to be coordinated and monitored, but is not normally an activity that needs a high level of environmental assessment prior to commencing the activity. When a higher level of environmental assessment is required, it should be established on a sound scientific basis.

Consultation Process on Exploration Rights Issuance in Nova Scotia

Effective mechanisms are already in place for activity-based consultation and project development through both CNSOPB and CEAA. These mechanisms provide relevant and specific assessment of impacts on current plans. However, during consultations and in preparation for the province's energy strategy, a number of groups suggested that they want more effective input in a number of areas.

Although exploration licences do not confer an automatic right to explore, and each activity requires environmental assessments, there is a perception that once a block is nominated or a licence has been given, a decision in favour of exploration has been made.

Consultation and public input before beginning the bidding process would help achieve a climate of openness and trust. Therefore, government will establish a provincial policy that before future exploration rights are issued within sight of land in Cape Breton and mainland Nova Scotia (18 km.), there will be special consultation with the fishing industry and coastal communities. The province will request the CNSOPB to develop procedures and practices for such consultation.

The province will offer to have the Minister of Energy and the Minister of Agriculture and Fisheries meet with representatives of the fishing industry to discuss long-range policy issues and have an annual forum to present an outlook on oil and gas activity. This outlook would be at the start of the CNSOPB's annual process of seeking nominations of exploration lands by industry. By discussing the outlook with fishing industry groups in advance, the province is able to receive industry input before the nomination process begins.

In the longer term, the province believes we are moving through a period of broad exploration that will be followed by a more focused level of interest. The pattern of exploration is to first identify the general geology and potential of an area, then follow up with a concentration of effort in the most promising areas.

The pattern can be most clearly seen in the area around Sable Island, where most of the activity to date has taken place. The exploration blocks are much smaller compared to the areas along the Scotian Slope where few wells have been drilled. The licence conditions require a single well to be drilled if a licence is to be extended from the initial five-year period to the full nine-year term. At the end of the licence, areas in which a significant discovery has been made are retained, and the balance of the land is returned to the Crown.

Under the current timetable, most of the land offshore Nova Scotia will have been returned for re-nomination and re-bidding by the end of the decade or earlier. Until these lands are returned, the next few years will likely see industry nominations limited the few remaining areas east of Sable Island out to the centre of the Laurentian Channel.

A study is currently underway by the Atlantic Petroleum Institute, with input from the fishing industry, to provide more detail on what the practices have been in other offshore areas.

Issue Resolution

The policy of the province is that issues such as non-attributable damage and compensation should be worked out between the two industries. Therefore, the province supports the current process of discussion to resolve these issues. However, if no resolution is reached within a reasonable time, the province is prepared to support the development of a mechanism for resolution. If voluntary efforts to resolve issues of compensation fail, the CNSOPB would be asked to create a mechanism following discussions with both industries and governments.

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Benefits from Offshore Resources

Statement of Principle

Oil and gas development in Nova Scotia will be conducted by the private sector in a manner such that Nova Scotians will be the primary beneficiaries when it comes to matters of employment and training, industrial and business opportunities, and research and development.

Discovering and developing offshore resources is very expensive. There are no guarantees that any particular well will contain commercial amounts of oil and gas, or that a company will earn a return on the investment it makes. Governments are not well positioned to take these kinds of risks, leaving it to the private sector to assume the primary responsibility for exploration and development on behalf of the public, as owners of the resource, and company shareholders. It is because of public ownership that there is a need for a clear public policy on oil and gas activities.

In the broadest sense, the benefits from offshore development include exploration and development, research and development, a better trained workforce, and business opportunities in the energy sector's worldwide supply chain. The benefits also include the development of skills and opportunities for non-energy-related fields, and a wide variety of opportunities to use the new energy sources.

As more projects come on stream, a critical mass develops, making it more economic to deliver a host of energy services in Nova Scotia. In addition, proximity to abundant energy sources offers a geographic advantage for development.

Government Role and Responsibility

Nova Scotia believes that hydrocarbon resources beneath the oceans off our shores belong to the people of Nova Scotia. The federal government, while taking a different position on resource ownership, has agreed in the 1986 Canada-Nova Scotia Offshore Petroleum Accord (Accord) that Nova Scotia should be the principal beneficiary of offshore hydrocarbon resources. The Accord and its federal and provincial (Canada-Nova Scotia Offshore Petroleum Resource Accord Implementation Acts) implementing statutes, state the requirements for first consideration and full and fair opportunity for Nova Scotians and Nova Scotia businesses. The Act also requires benefits plans to be filed with the jointly appointed regulator, the Canada-Nova Scotia Offshore Petroleum Board (CNSOPB), and to include plans to address issues such as research and development, training, and employment.

The Act also gives to the Government of Nova Scotia the right to acquire on commercial terms up to half the ownership of offshore mainline pipeline transmission systems. The Petroleum Resources Removal Permit Act gives the province authority to regulate the availability of natural gas liquids.

Both the federal and provincial governments have a joint responsibility to see that the provisions of the Act are met and to develop associated regulations. The ministers have delegated their responsibility for the administration of the regulatory authority to the CNSOPB. The province retains the responsibility of representing the interests of the people of Nova Scotia and the economic development of the province. To that end, the province pursues employment and business development opportunities, promotes provincial capabilities, and secures fair market advantages for Nova Scotia businesses. The province also has a responsibility to manage its business climate and regulatory affairs in a way that reduces uncertainty and offers efficient, consistent, and effective regulation.

Strategy Objectives

- To maximize Nova Scotia employment and training in the oil and gas industry, with particular reference to skilled occupations for which there is potential for employment over the long term and in which skills are transferable to other industry sectors.
- To optimize oil and gas business opportunities for existing and new Nova Scotia based companies with particular reference to:
  ongoing oil and gas production,
  engineering design and project management,
  construction and fabrication of offshore and onshore facilities,
  goods and services that can be exported competitively, and
  goods and services that can be extended/adapted into other sectors.
- To set the stage for petrochemical industrial development by ensuring that natural gas and gas liquids supplies are available on a commercially competitive basis.
- To provide access to market-based opportunities for natural gas customers in the residential, commercial, and industrial developments sectors.
- To take advantage of Nova Scotia's proximity to the natural gas supply and its lower transportation costs.
- To develop Nova Scotia-based research and development initiatives.
- To create a high level of public understanding about the economic impact of offshore exploration, development, and production.

Actions to Achieve Objectives

2001-2005

- Government will vigorously pursue opportunities to maximize the economic value of its offshore resources by full participation in the regulatory approval process. Government's position on the project will depend upon the degree to which a project meets the province's objectives.
- The government intends to reach Offshore Strategic Energy Agreements (OSEA) with the developers of each offshore project. An OSEA is a voluntary agreement process designed to address how a project will help the province to achieve its objectives. Some of the issues which will be addressed include:

1. the project developer's assessment of the underlying economics of the project, including as sumptions about energy supply and demand in the markets to be served;
2. the project developer's plan to achieve Nova Scotia's economic objectives, including those outlined in the benefits plan to be filed to the CNSOPB;
3. the prospect developer's plan to increase Nova Scotia's capacity and capabilities for gaining value from the offshore;
4. measurement of Nova Scotia's overall economic gains from the project; and
5. the province's rights and requirements with respect to investment in pipeline infrastructure.

- Promote local supplier and support-industry development and business opportunities. Particular emphasis will be given to enterprises that have identified areas of local competitive advantage or niches with worldwide trade potential.
- Work with the private sector to identify, assess, and promote the development of additional fabrication capacity in the province.
- Work with regulators, energy companies, and the service/support sector to ensure benefits reporting is collected in a more efficient manner.

2006 and Beyond

- Review the success of the OSEA process.

Factors Leading to a Change in Strategy Direction

If and when substantially larger discoveries of natural gas and oil are achieved, the province will fully review oil and gas benefits objectives to ensure that they are in line with the changing capacity and skills of its workforce, and the success of its entrepreneurs.

Links to Energy Strategy Themes

Offshore Strategic Energy Agreements (OSEA) will assist Nova Scotians to receive full and fair opportunity and first consideration, and to improve our competitive skills and capacities to **Power our Economy**. An OSEA will also help Nova Scotian individuals and businesses to diversify and broaden their interests, enabling growth beyond a Nova Scotia-based oil and gas industry to help **Secure our Future**.

Background

History of the Nova Scotia Offshore

The Nova Scotia offshore oil and gas industry has been under development since the first significant gas discovery at Onondaga off Sable Island in 1969, followed by other significant oil and gas discoveries in the 1970s. In 1979 Nova Scotia's first large-scale natural gas discovery was made at Venture. Project planning for Venture began during the 1980s, but low energy prices caused the Venture gas project to be put on hold in 1987.

Meanwhile, plans were made for a small-scale oil project at the Cohasset-Panuke oil discoveries, and production began in 1992. It became Canada's first offshore production project. Cohasset-Panuke allowed an offshore service sector to be started, and gave the local fabrication industry the experience needed to gain significant contracts on Hibernia and subsequent projects. However, the project itself suffered from low oil prices and cost overruns. The project reached the end of its economic life in December 1999 after producing 45 million barrels of high-quality oil.

Around the middle of the decade a provincial study determined that a project that combined a number of natural gas discoveries could be successfully developed. Shortly thereafter, Mobil Oil joined forces with Shell Canada and other partners to pool their discoveries and make an economical joint venture project: the Sable Offshore Energy Project (SOEP), under the name: Sable Offshore Energy Inc. (SOEI).

Offshore Projects

Sable Offshore Energy Project

Construction began in 1997 on three wellhead platforms and one offshore processing platform for the development of three gas fields. A second phase, or Tier II, of the project to bring three additional fields into production was planned to come on stream later. The gas is brought to a gas plant at Goldboro in Guysborough County, and the natural gas liquids (NGLs) are piped to a fractionation plant at Point Tupper at the Strait of Canso. The natural gas travels by pipeline to Nova Scotia, New Brunswick and New England.

SOEP Set the Stage for Industry Development

SOEP contributed to the economy and future growth of an offshore industry in Nova Scotia in a number of ways, the most important of which was to demonstrate the commercial viability of offshore gas production. The project also created the pipeline infrastructure for the delivery of natural gas to market.

The opening of large-scale markets for Nova Scotia offshore resources has led to a major increase in exploration activity, which should lead to more discoveries, more development projects, and a larger industrial base. As of November 2, 2001 active exploration licences and exploration bid commitments amounted to $1.56 billion. Activity in a number of licence blocks has already significantly exceeded basic commitments.

SOEP Economic Impact

SOEP also made a significant contribution to the Nova Scotia economy in the form of new business opportunities and jobs. SOEP spent approximately $2 billion up to the end of 1999. The province's review of local industry during this period indicates our actual and potential capacity to participate directly in that expenditure was in the range of $900 million to $1 billion. For example, while the province was capable of supplying services such as offshore supply boats and welders, it was not capable of manufacturing the steel pipe that was used in the project development.

Approximately $620 million (62-69%) of this longer-term potential was spent on Nova Scotian goods and services, an impressive performance given that it was the first major offshore project and that our companies competed through worldwide tenders. Another $153 million was provided by companies elsewhere in Canada.

It is worth noting that the only period of strong economic growth in Nova Scotia over the past decade has been during the construction of SOEP (Table 1).

Table 1. Growth rate (%) of the Nova Scotia gross domestic product (GDP), 1990-2000.

Year	GDP Growth Rate (%)*
1990	-0.4
1991	-0.3
1992	1.5
1993	0.8
1994	0.4
1995	1.7
1996	0.3
1997	3.3
1998	3.4
1999	5.7
2000	2.4

* in constant 1997 dollars

SOEP Tier II

By the fall of 2001 planning is well underway for the second phase of the Sable project by the SOEI consortium. A decision to proceed with the first of Tier II's three additional fields, Alma, is expected during the fourth quarter of 2001, with potential production in 2003. The estimated capital expenditure for all three platforms and associated structures in Tier II is approximately $1 billion.

Deep Panuke

A second major gas project being planned is based on PanCanadian's 1999 discovery of a natural gas field below the Panuke oil field. The discovery well was drilled from the production platform in an effort to discover more oil reserves to lengthen the life of the Cohaset-Panuke Oil Project. Instead, the well flowed natural gas at rates in excess of 50 million cubic feet per day (mcf/d).

Delineation drilling in 1999-2000 established reserves in sufficient quantities for PanCanadian to declare it a commercial project in 2001. The company is planning to deliver a development application to regulatory authorities in the fourth quarter of 2001. The initial project description calls for a billion dollar project producing 400 mcf/d of gas from reserves in the range of one trillion cubic feet (tcf).

Other Potential Projects

The Scotian Shelf area around Sable Island has been the site for most of the exploration activity and discoveries in Nova Scotia waters. In the fall of 2001, both PanCanadian and Shell Canada were drilling exploration wells in an effort to discover more sources of oil and gas in the relatively shallow waters near Sable Island. Additional discoveries could be tied into the Sable or the Deep Panuke projects to increase production or to lengthen production life.

Most of the recent exploration bidding has been based on the anticipation that even more significant discoveries can be made in the deep waters off the Scotian Slope. Modern geological theories have been developed on discoveries in the continental slope all around the Atlantic Ocean. In areas such as Brazil, the Gulf of Mexico, and West Africa, deepwater locations (in excess of 300 m of water) have proved to contain hydrocarbons in very significant quantities.

The first new-era well based on these geological assumptions and advanced technology is expected to be underway before the end of 2001 by Marathon. Deepwater discoveries by Marathon or others could well lead to multiple projects and even greater offshore exploration activity. Others involved in deepwater exploration include PanCanadian and Kerr-McGee (both have drilling planned for 2002), Chevron (2002), Shell (late 2002 or early 2003), Imperial Oil, and British Petroleum.

Although the geology in the shallow waters offshore Nova Scotia has tended to result in natural gas discoveries, the ratio between oil and gas in the deep water along the Atlantic margin has been more equally split between oil and gas. Accordingly, oil may once again play a major role in the Nova Scotia offshore.

Benefits to be Received from Offshore Oil and Gas Developments

The benefits to be received include:

(1) economic rents and taxes,
(2) building Nova Scotian business strengths,
(3) skills improvements and knowledge transfer,
(4) research and development, and
(5) setting stage for petrochemical developments.

Economic Rents and Taxes

The people of Nova Scotia own the resource offshore, and those who make the discoveries and carry out the development of the resource pay economic rents in the form of royalties. In the case of Nova Scotia, the royalty regime is designed to encourage exploration to enable a better understanding of the resource size and potential (see Part X: Energy Fiscal and Taxation Policy for a more detailed discussion of royalties).

In addition to royalties, developers also pay provincial corporate income taxes on their profits, and a number of other levies including capital and municipal taxes.

Employment

The growth of this new industry offers Nova Scotians more career and employment choices. Jobs in the oil and gas industry come in a wide range of occupations onshore and offshore. In the fall of 2000 Nova Scotians were working in offshore operations, onshore engineering design management and planning, support services such as helicopter pilots and supply boat captains as well as geologists, accountants, lawyers, cooks and meteorologists.

The new spending by people directly employed help drive the general economy and provide more jobs elsewhere. Current employment levels directly related to the offshore are well in excess of 2,000 people. Efforts are now underway to achieve more detailed and regular reporting on employment levels.

Building Nova Scotia Business Strengths

Growing Existing Local Businesses- The growing size of the Offshore Technologies Association of Nova Scotia (OTANS) from a base of 110 members in 1995 (before SOEP) to 462 members today shows the strength of current and anticipated business opportunities in the province. Marine-related supply and support is now a well-entrenched sector in Nova Scotia. This is shown in areas such as supply boats, diving, and helicopters. However, as this sector grows it will attract increasing also attracts competition from large international companies to challenge local suppliers.

Partnerships with Others- Expansion into more specialized support services and construction often means partnerships with firms already established in these areas. For example, Kvaerner, a UK-based company, partnered with SNC Lavalin, a Canadian company with long ties to Nova Scotia, to do the Alma field front-end engineering and design (FEED) work and potentially all engineering, procurement and construction management (EPCM) for the Sable Tier II project in Halifax. In Tier I this work was mostly done in Houston and Calgary. A similar contract for PanCanadian's Deep Panuke project is the result of a partnership between Accent Engineering and Saipem Energy.

Supplying the International Market- An example where a Nova Scotia firm built on a market at home to then sell around the world is Envirosoil. In the early 1990s it established a business in Bedford to treat hydrocarbon-contaminated soil. With the emergence of the offshore, the company discovered it could also treat oilfield drilling waste (drill mud and cuttings) using the same low temperature thermal desorption technology it was using to treat contaminated soil. Through a consortium of companies, it won a contract with SOEI to treat drill mud and cuttings.

With the benefit of this experience it joined forces with two other Nova Scotia companies, Jacques Whitford and Inland Technologies, to bid on the remediation of a large contaminated site in Brunei and were awarded the contract by Brunei Shell Petroleum Co. in 2000 (Shell is one of the SOEI partners).

Skills Improvement and Knowledge Transfer

Development of a full-scale offshore oil and gas industry requires new skills and experience. In the project development phase they include: engineering design, project management, and construction management and trades. This improvement in our human resources benefits future oil and gas projects, as well as other economic sectors, and improves our international competitiveness. The operations phase of an oil and gas project also provides wide-ranging benefits.

People trained to operate machinery and equipment gain long-term opportunities not only in the offshore but also in many other related industries. For example, the skill gained by an instrumentation technician operating the Thebaud offshore processing machinery can be transferred to a pulp and paper mill or a power plant. Likewise, the skills in computer modelling for large oil and gas reservoirs can be applied to a number of other computer simulation applications. Therefore, the province values projects that broaden skills and provide new opportunities for Nova Scotians (see Part II, Section 4: Training for the Energy Sector).

Research and Development

Industrial growth has the potential to bring new knowledge to Nova Scotia. In the case of the energy industries, the potential agenda for innovation is broad and deep. As energy is a critical underpinning for an economy, an increase in knowledge in this area can also be very beneficial. In Nova Scotia, the arrival of the offshore industry in a major way has sparked an increase in university and public laboratory research and development. The local academic base for potential energy research is significant, and the private sector has already contributed to work at a number of universities. Donations from the oil and gas sector have enabled the establishment of the Atlantic Canada Petroleum Institute (ACPI) and helped fund many studies under Canada's Environmental Studies Research Fund. The important matter of increased research and development for offshore oil and gas development is discussed in Part IX: Research and Development.

Setting the Stage for Industrial Development-The government views the arrival of natural gas in the province as setting the stage for a petrochemical industry and other energy-intensive industrial developments.

A critical issue for petrochemical development is the availability of a sufficient quantity of natural gas and natural gas liquids, and the assurance that the feedstock will be available to a petrochemical producer. The supply itself depends on the mixture in a particular gas stream in future discoveries. With respect to the availability of supply to a producer, Nova Scotia is already accomplishing this in a number of ways. First, it has a memorandum of understanding with the Sable Project owners (SOEI) that allows for the supply of natural gas liquids in Nova Scotia on commercial terms on two years' notice. This notice period is sufficient for most petrochemical developers, as construction would take longer than that. It is expected that future developers will sign similar agreements through the OSEA process.

Secondly, government has established the principles of requiring all pipelines to come ashore in Nova Scotia before going to market. Each pipeline developer should demonstrate how its plans help develop a critical mass of natural gas liquids necessary to develop a petrochemical industry. Petrochemical developments in Nova Scotia are discussed in Volume II, Part II, Section 5: Using Nova Scotia Resources.

Setting the Stage for Distribution

Access to Natural Gas Supplies- The arrival of natural gas in Nova Scotia was accompanied by firm contracts for 77 mcf/d by Nova Scotia-based firms. Emera, StoraEnso, United Gypsum, and the SOEI fractionation plant all have access to and use Sable natural gas. In addition, the memorandum of understanding between SOEI and the province guaranteed distribution access to the Sable gas supply in the amount of 10 mcf/d.

Local Gas Distribution- Gaining access to natural gas for homes and businesses on an unsubsidized, economic basis offers more fuel choices and opens up new business opportunities in areas that require the intense flame that only natural gas can supply economically. The initial plan to distribute natural gas failed because it was uneconomic. The new rules will be based on sound economic principles. Similar arrangements will be made with future producers.

Public Understanding of Offshore Development

Benefits Received

Public opinion on the value of offshore development has tended to focus on the jobs created and the dollars spent in Nova Scotia. Public understanding on theses issues is reflected in the fact that public opinion research in the winter of 2001 showed that 65% thought the arrival of the industry had a major/ moderate positive economic impact. More than half of those who expressed an opinion thought oil and gas would make the largest contribution to growing the province's economy. Job creation was given as the most significant positive benefit.

However, it is recognized that a significant number of Nova Scotians still think the oil and gas industry has not provided enough benefits.

Accounting for Benefits

There are many ways of measuring the value to an economy and a province of the development of an industry. The gains include both tangible and intangible benefits; some show up immediately, some lay the foundation for future activities, and some have indirect and long-lasting impacts that may not be at all clear today. Even an apparently simple concept of spending money on Nova Scotia goods and services is not as straightforward as it seems.

Take for example the case of a supply boat built in Halifax, based in Halifax, and managed by a Halifax company. Despite these factors, when this boat works on a Nova Scotia offshore project, the benefits accounting process assesses much of the value as foreign. The reason is that the steel, engines, and machinery are all built or fabricated somewhere else. Nova Scotia does not have a broad manufacturing base, and thus, in the strict world of CNSOPB benefits accounting, few activities (other than those services that are almost entirely labour) are calculated to have a high Nova Scotia content, nor are they likely to in the near future. Foreign financing for locally built leased equipment such as vessels can also reduce the local content calculation.

Project developers are required to report regularly on Nova Scotia benefits in terms of money spent in Nova Scotia, employment levels, and other criteria. The CNSOPB reports these results. There is no requirement for the energy companies to generally publicize or report the success (or failure) of sub-contractors in obtaining work. The accounting methodology used by the offshore boards for benefits, while fair and consistent, is not well understood.

Benefits Legal Framework

The regulatory environment governing the development of Nova Scotia's oil and gas resources was established by the Canada-Nova Scotia Offshore Petroleum Resources Accord and the implementation Acts. The Accord explicitly recognizes the rights of Nova Scotia to be the principal beneficiary of oil and gas resources off its shores. The Accord and the Acts also recognize the equality of the federal and provincial governments in the management of these resources. The legislation works to ensure that the pace and manner of development optimizes the social and economic benefits to Canada as a whole, and to Nova Scotia in particular. Further, the Acts give the provincial government the right to tax oil and gas resources as if they were on land.

The Acts require that a "Benefits Plan" must be submitted for any work program for exploration or field development. In this plan the operator must commit to the principles of providing "full and fair opportunity and first consideration in procurement, employment, research and development" for Nova Scotians.

The Acts do not require targets or quotas for Nova Scotian or Canadian content or participation in offshore exploration, development or production projects.

Public Advice

The main thrust of public advice on benefits was for the government to think in terms of creating long-term employment and economic benefits for Nova Scotians. Most who offered advice in this area spoke specifically about opportunities for sustainability and exports, and increasing jobs in the supply and service sector so it could expand into other industries and compete worldwide. Also advocated was the use of petroleum revenues to support research and development and thus help make the long-term transition to a post-hydrocarbon era.

Analysis

International Experience

In designing a strategy to achieve a proper balance of benefits from offshore oil and gas developments, the province examined the experience of a number of other countries. The approach to gaining economic benefits ranges from total state development control, as in Malaysia, to the very hands-off approach in Australia. Nova Scotia wishes to gain a strong base of activity and maximize our economic opportunities through the development of a non-renewable resource. But it does not believe the public sector can or should undertake the exploration and development risk associated with the North Atlantic offshore. Hence a middle approach is adopted.

In general terms, a number of factors are believed to be critical in assessing comparability of offshore experiences:

- Geography and Environment - The cost of developing a shallow well a few feet offshore in the Gulf of Mexico is far different from the cost of operating 200 km off the coast of Nova Scotia during harsh winter storms.
- Geology - The size of the potential resource base has tremendous implications for the profitability of the development.
- Prices - The long-term expectations on oil and gas prices at the time of discovery or planned development has a major impact on the economics of a project.
- Legal Framework - The tools available to the province for development compared to nations where all the tools and national objectives are available.
- Diversity of Industrial Development - There is an important difference in respect to access to businesses long established in heavy industry, machinery manufacturing, etc.

In this context, the North Sea appears to best reflect a number of attributes similar to those experienced offshore Nova Scotia: high capital costs due to water depth, harsh winter climate, and distance from land. A number of submissions to the energy strategy suggested that we develop our offshore with the experience of the North Sea in mind and adopt approaches taken by Norway in particular.

Norway

The first major discovery of oil in Norway took place in 1969 when the Ekofisk oil discovery was made. First estimates were for 1 billion barrels (bbl) of oil in reserves (later revised to 2 billion bbl). Two years later the giant Frigg gas field was discovered with 6.6 tcf of gas in reserves in one field. Three years after that Statfjord became the world's largest offshore oil field discovery, with estimated reserves of 3 billion bbl of oil, later upgraded to more than 4 billion. Other discoveries followed, and the decade closed in 1979 with the discovery of the giant Troll gas field with nearly 46 tcf in one field.

To put this into perspective with Nova Scotia, although our discoveries were being made around the same time (Onondaga in 1969 through to Venture in 1979), the single Troll gas field was nearly 200 times the size of Onondaga and 40 times larger than Venture. And the Troll field was not alone. Norway had many other fields that were larger than Nova Scotia's.

In the space of a decade, Norway had multiple, very large discoveries which created the foundation for the confidence that the industry would be a long-term offshore oil and gas producer. The rapid pace of discoveries and their huge size combined with a decade of very high sustained oil and gas prices (which meant the profitability was extremely high), and the fact that Norway is a unitary state with full national powers in determining direction for its industry, allowed Norway to develop a broad policy scope with which to direct industry development.

Today Norway has more than 30 major fields either in production or approved for production and more than 80 discoveries for which development decisions have not yet been made. Each year an additional six to ten discoveries are made.

United Kingdom

The first commercial hydrocarbon discovery in UK waters was the West Sole gas field in 1965. In 1970 the giant Forties oil field discovery (2.6 billion bbl) rapidly strengthened the development trends in the North Sea.

By the end of 1997 there were more than 186 gas and oil fields in production in the UK, and close to 100 production platforms had been commissioned. The UK infrastructure includes more than 16,000 km of offshore pipelines. In 1997 the UK provided direct employment for more than 33,000 people and accounted for 2% of the United Kingdom's GDP.

Table 2. Comparable offshore oil and gas production and reserves, 2000.

	Norway	**United Kingdom**	**Nova Scotia**
Oil production	3.1 million bbl/d	2.6 million bbl/d	0
Oil reserves - proven	27 billion bbl	5 billion bbl	0
Natural gas production	3.8 bcf/d	9.1 bcf/d	0.5 bcf/d
Natural gas reserves	123 tcf	27 tcf	6 tcf

Overall Comparison to Nova Scotia

Clearly, Nova Scotia is in its infancy when compared to the fully integrated industries of Norway and the United Kingdom. Nova Scotia does not currently have the resource base required for the kind of economies of scale seen in Norway. The early realization that the resource base was large and prices high allowed the international energy companies to anticipate high returns on their investments, even with the demands Norway made in achieving high levels of local ownership and business development.

Establishing a large resource base is therefore critical to assuring the service sector that new large-scale facilities will be used. Once such a base is present, together with clear prospects of multiple projects stretching out for decades, new services and facilities will emerge. These factors allowed Norway to use state oil companies to dictate development and financial investments. Not all investments were successful and many suffered when oil prices fell. But ultimately the resource size carried them through, and today the state companies are being privatized.

Nova Scotia's offshore is at a crossroads. The current heavy exploration activity is expected to lead to more discoveries. Such discoveries would bring certainty, improve investor confidence, and strengthen Nova Scotia's ability to accelerate the achievement of the province's objectives. However, those discoveries have not yet been made. Therefore, the province takes the approach that determining the scope of our potential through additional exploration is a first and fundamental step in implementing its energy strategy.

It is also recognized that the results of the exploration may vary widely. The range of opportunities will depend upon the scale of individual fields, what kind of hydrocarbons are found, and the long term economics of the petroleum industry at the time of development. A critical factor is the current stage of Nova Scotia's development. Accordingly, the energy strategy recognizes that to achieve the province's objectives, flexibility to adapt to changing circumstances is essential.

Offshore Development Industry Analysis

SOEI Assessment

SOEI's 1998 Supplier Assessment report to the CNSOPB provided an assessment of the development of the local supply and services sector and local infrastructure. Table 3 identifies several areas where opportunities exist for local suppliers, distributors, subcontractors, manufacturers, and the service industry to increase their participation, and also identifies areas of improvement.

Nova Scotia is not a significant manufacturer of materials and equipment used in the offshore oil and gas industry. Specialized offshore drilling construction and installation equipment is provided by major international companies such as Saipem, Santa Fe, Rowan, and Allseas. A review of local industry during this period indicates our actual and potential capacity on Nova Scotia goods and services for SOEI Tier I was in the range of 62-69% of the approximately $2 billion in expenditures to the end of 1999.The gap between our potential and our performance is due to the fact that most of the project planning, engineering, and procurement, and a majority of offshore facilities construction, took place elsewhere.

This analysis shows the magnitude of improvement possible. The province recognizes that the full potential will be extremely difficult to achieve, and in fact will likely change from project to project. This analysis is viewed as a useful tool in targeting areas for improvement and measuring the success of development of the industry as it matures and evolves.

Nova Scotia Current Strengths

Nova Scotia companies have been providing exploration support services, supplies, and equipment to the offshore sector for more than 30 years. Examples include local supply vessels, helicopter services, diving/ ROV, shore-base, communications, weather forecasting, and catering. International companies with a long-term presence in Nova Scotia provide offshore drilling rigs; well coring, testing, logging, and cementing; down-hole services; sub-sea services; and many more. Nova Scotia has also demonstrated its ability to fabricate large industrial structures, especially modular sections including early versions of semi-submersible drilling rigs.

In more recent years, Nova Scotia companies have been successful in three large fabrication and construction contracts awarded by SOEI. These contracts required local contractors to form joint ventures with international partners. The benefits of these arrangements included the transfer of important technical and management knowledge, and increased experience and knowledge for future contracts.

In addition, the experience in building the North Triumph deck and early jackets (MMI/B&R), fabrication of offshore living quarters (Fabco-CKT), and the construction management of the onshore facilities (gas plant, fraction plant, onshore gathering system (pipelines), gas lateral) proved our capability for this type of work.

Nova Scotia Areas of Potential Strength

The SOEI report indicated three business areas in which Nova Scotia could seek improvements and have a reasonable expectation of achieving them:

- engineering, procurement and project management (EPCM),
- instrumentation and control, and
- offshore construction and fabrication.

Front End Engineering Design and Procurement (FEED)

Local engineering, design, and procurement operations are intrinsically important, not only for the value they add to our economy, but also for the opportunities they create. Locating these activities and decision-making capabilities in Nova Scotia enhances networking. It enables Nova Scotia firms to develop relationships with key project functions and management personnel. It also improves overall understanding and success in the bidding process.

Table 3. SOEI assessment of Nova Scotia capabilities in key project areas.

Performed well	General construction of onshore facilities; marine services including crewing, shorebase, supply vessels, and diving/ROV; general services (catering, vehicles, office equipment); general equipment, goods, and services (transportation, fuel, cranes, etc.)
Adequate and acceptable participation	Heavy marine services and offshore pipelines
Could have done better	Offshore construction and fabrication; instrumentation and control; engineering, procurement, and project management (EPCM)
Not likely to do	Supply of primary structural steel (including pipe) and industrial, mechanical, and packaged equipment (pumps, compressors, and heat exchangers)

During the SOEI Tier I, local engineering companies provided engineering and design services for the onshore facilities, gas plant, fractionation plant and some offshore. However, the majority of the Sable project engineering work was done outside the country; and much of the rest was done in Alberta.

Engineering Procurement and Construction and Management Functions (EPCM) Being Done in Nova Scotia

At an early stage the province identified the gaps in EPCM, and has made it a priority for improvement. As a result, the province expects the SOEI Tier II and the PanCanadian Deep Panuke project will both see all of their FEED and ECPM performed in Nova Scotia. This achievement and capability will set the stage for the rapid future growth in work of this nature in the province.

Instrumentation and Control

The province took action on the identification of a need for more instrumentation and control capabilities by establishing the Industrial Control Technician/Instrumentation (ICT) Lab at NSCC's Marconi campus in Sydney. The first class entered the college system in September 2000 and graduated in 2001. The course builds on the skills that students have attained through the College's Electromechanical Technician and Electronic Engineering Technician diplomas, and on the skills of those who came to the college with suitable work or post-secondary backgrounds.

Fabrication

A study commissioned by the Nova Scotia Petroleum Directorate and Enterprise Cape Breton Corporation (Infrastructure & Manufacturing Capabilities Study - 2001) outlined the wide variety of fabrication facilities available in the province for modular construction. One of the gaps remaining is the availability of a large dockside facility with adequate lay-down area located near a large, skilled workforce.

SOEI's assessment of Nova Scotia fabrication capabilities also noted the difference between our capacity for modules and our lack of capacity for larger structures: "Local yards have the capability, including skilled labour resources, to take on smaller projects. But physical restrictions of the yards, including size of working area, weight capacity of dockside and construction areas, and insufficient dockside water depths can limit the scope of work possible."

SOEI Memorandums of Understanding

Access to natural gas and natural gas liquids was one of the issues dealt with by a memorandum of understanding between the province and the SOEI partners which contained seven agreements.

These agreements cover a number of important issues.

- Funds are provided by SOEP producers to reduce the delivered cost of natural gas to consumers in Nova Scotia.
- Gas volumes are set aside by the producers to ensure that natural gas is available for Nova Scotians.
- The SOEP producers are committed to supplying ethane and natural gas liquids to future petrochemical projects in Nova Scotia.
- Initiatives support training programs and research and development related to the offshore.
- Measures to ensure that production plans are carried out in a way to protect the royalty interests of the province.
- Potential legal action against the province regarding the sale of Nova Scotia Resources Limited was settled (two agreements).

The issue of the province's right to purchase at least 50% of any offshore Nova Scotia gas transmission pipeline was settled separately.

Additional Fabrication Capacity

Based on the current project development activity of SOEI Tier II and Deep Panuke, it is not anticipated that Nova Scotia will need large investments in new fabrication facilities. However, if Deep Panuke and SOEI Tier II are developed simultaneously, some enhancement of existing facilities may be required to achieve a satisfactory level of Nova Scotia participation in these projects. If there are multiple projects beyond SOEI Tier II and Deep Panuke, the province believes a strong business case will be made for a significant additional private sector investment to expand Nova Scotia's capacity in this area.

Government will actively work with the private sector to identify, assess, and promote enhancements to existing facilities, and to encourage the development of new facilities as the need emerges. It will encourage potential project developers to work with existing fabricators and those proposing new sites, thereby improving Nova Scotia's long-term capabilities. Some of the key determining factors include the availability of management experience and trades expertise, sources of private sector capital, dock capabilities, and the required amount of land for laying down components and assembling large structures.

Regional Distribution of Benefits

Current Impact

The economic value from offshore development has had widespread impact in Nova Scotia, even though this is not always readily apparent. For example, the general economy is better off with increased employment and business opportunities regardless of where the specific jobs or businesses are located. But it should also be recognized that the very nature of lengthy offshore job rotations allows offshore workers commuting between the offshore and the Halifax Airport to have their homes in the Annapolis Valley or Cape Breton or wherever they choose. In fact, many Rowan Company workers live in Pictou County and work on rigs offshore Nova Scotia and around the world.

There are many visible signs that offshore development is having a positive impact on Nova Scotia communities. Tangible signs are obvious in Halifax where the energy companies are headquartered; at the Strait of Canso where the SOEI gas fractionation plant is located and where Maritimes and Northeast Pipeline supplies natural gas to major local industries; in Guysborough County where the pipeline comes ashore and the natural gas separation plant is located; on the eastern shore where a pipe-coating facility operated during SOEI construction; and throughout northern Nova Scotia where the Maritimes and Northeast Pipeline runs.

Future Regional Distribution of Benefits

The breadth of exploration effort off our shores opens new opportunities for development in Cape Breton and along the south shore. Other energy developments in Atlantic Canada will also play a role. For example, the development of natural gas supplies in the Gulf of St. Lawrence, the Laurentian Subbasin or offshore Newfoundland and Labrador could provide natural gas supply to Cape Breton and important incremental gas supplies to the Strait area. The development of a pipeline landing point on the south shore would also bring the advantage of access to gas to another part of the province.

Securing the Benefits

Government expects the Regional Development Authorities (RDAs) to continue to play an important role in helping to turn the potential into reality. Through the Department of Economic Development and the province's Economic Growth Strategy, the province will pursue opportunities to use natural gas supplies as a driver for new industrial development. The new Department of Energy will work with Economic Development, the RDAs, OTANS, businesses, and organizations directly to help them identify such business opportunities.

The federal government through ACOA, Enterprise Cape Breton Corporation, the Atlantic Innovation Fund, and the Cape Breton Growth Fund have the mandate and interest to support a number of economic development and R&D initiatives in Nova Scotia. The province will work with federal government in the area of energy to promote the growth of small and medium manufacturing and service opportunities. Particular emphasis will be placed upon opportunities where the business case shows promise for east coast or export possibilities. Creation of technologies or skills with potential for transfer to non-oil and gas sectors will be pursued, as well as supplier development and preparation initiatives such as an examination of deep water technologies; support for R&D and innovation working together with ACPI, and the study and analysis of the labour market.

Government will encourage the private sector to consider developing supply bases, service centres, fabrication facilities, and other energy sector developments throughout the province. With more discoveries, the business case for such regional developments will be strengthened.

Gaining Full Value from Resource Development

The Nova Scotia Approach

As stated earlier, approximately 62-69% of the longer-term potential expenditures were spent on Nova Scotian goods and services in the SOEP project by the end of 1999. This is an impressive performance given that it was the first major offshore project and that our companies competed through worldwide tenders. Another $153 million was provided by companies elsewhere in Canada. Between January 200 and June 2001, Nova Scotia and other Canadian companies supplied 73% of the additional expenditures on the SOEP project. This is a clear indication of our growing ability to meet the needs of the offshore oil and gas industry.

As the industry changes through time, particularly as developments move to deep water, its needs will change. Nova Scotia's capabilities to supply these projects will also evolve over time. As the provincial industry's capacity expands, the economic value of future projects (direct spending on goods and services, supply agreements, training, research and development, etc.) should reach a higher share of our potential.

What is the province's ultimate goal? It is to achieve 100 per cent of Nova Scotia's potential. Government will take firm actions in pursuit of this goal.

A number of components constitute the economic value and benefits a project should deliver to Nova Scotians. Some of these include the right of pipeline ownership or compensating offset, the supply of feedstock for a petrochemical industry, the supply of natural gas for distribution to business and homes, contributions to the advancement of energy research and development, support and contribution for training and apprenticeship of Nova Scotians, and domestic and export opportunities for the use of local supplies in each project. It is recognized that the economic value of each of these components will vary by project, depending on the increasing capability of Nova Scotians and the structure, characteristics, and market conditions of each project.

Government will vigorously pursue opportunities to maximize the economic value of its offshore resources by full participation in the regulatory approval process. Government's position on the project will depend upon the degree to which a project meets the province's objectives.

Currently, each project must have an approved development plan, including a benefits plan. The province will have three primary roles in the approval process:

- it will be an active intervenor, presenting the province's position through evidence,
- with respect to certain elements of the project, the province is the regulator (for example, through the UARB and as an equal partner in the CNSOPB), and
- the provincial minister has the final authority to accept or reject the development plan.

Offshore Strategic Energy Agreements

The government believes it is in the best interests of both parties to clearly understand each other's expectations and obligations regarding the project, prior to the full regulatory process. It would prefer to enter into an Offshore Strategic Energy Agreement (OSEA) for each project. These voluntary agreements would be reached with a clear understanding of the market conditions facing the proposed development, the capabilities of Nova Scotians to provide goods and services, and the expectations of the province.

The major elements of the economic value of a project to Nova Scotia are to provide for pipeline ownership or compensating offset, to supply petrochemical feedstocks, to provide access to natural gas, to support and contribute to training and apprenticeship, to support and contribute to research and development, and to support the use of local suppliers in the project and worldwide supply chain.

The intention would be to assess the overall success of a project, recognizing the possibility that unforeseen circumstances or opportunities could affect a particular objective. For example, a new technology might come to the fore during planning; new discoveries in a nearby area could have an impact on project design or timing, or an expected supplier may decide not to bid.

In reaching an OSEA, the government will obtain energy industry expertise as part of the province's negotiating team. The objective would be to complete such agreements within specified time frames. An OSEA would have a clear dispute resolution mechanism. The government and the developer would come to an understanding of Nova Scotia's capabilities. Success would be measured by the extent to which Nova Scotia achieves its potential.

Continual long-term growth in the offshore will allow Nova Scotia to strengthen and diversify its economy. Therefore, an OSEA will place particular emphasis on proposals that create opportunities for Nova Scotian firms to export or expand into other sectors. The agreement would also give consideration to how the design of the project (e.g. offshore vs. onshore gas processing) contributes to achieving the province's oil and gas objectives.

Authority on benefits management and monitoring resides with the CNSOPB, with oversight responsibilities exercised by the two ministers. The OSEA's are designed to ensure important issues of provincial concern are well-understood and addressed before the project regulatory process is complete. By showing how a development plan fits with the province's objectives, the province gains an important tool for long-ranging planning, and developers gain early support for the benefits part of their development application.

Public Information and Communication

The province believes it is critical that information concerning the oil and gas sector be regularly collected and reported. For the country as a whole, Statistics Canada collects the economic data (employment levels by sector, business spending and intentions, etc.) required for public planning. On a national basis this information is timely and accurate. However, when it comes to a rapidly growing and changing industry like offshore oil and gas in a small province, the data sample sizes are too small to adequately capture the details of any economic impacts.

The offshore oil and gas industry has the potential for making a major difference in the Nova Scotia economy. To make meaningful decisions in their own lives, the public needs to have information on development trends and patterns. Without this information, businesses can not anticipate economic opportunities, students can not make proper career choices, municipalities can not carry out proper land-use planning, and citizens in general can not judge the importance of an industry whose primary activity is hundreds of kilometres offshore.

Accordingly, government places a high priority on ensuring that information on industry activities is gathered and reported in a consistent and credible fashion. Discussions are underway between the province, the CNSOPB, the Canadian Association of Petroleum Producers, and the Offshore-Onshore Technologies Association of Nova Scotia with respect to the most efficient and effective methods of gathering information for measuring the full impact of the industry on Nova Scotia. In conjunction with the gathering of information, the province is interested in analyzing the impact of the industry through economic models and studies. The Nova Scotia Department of Finance has begun a detailed economic impact assessment of the offshore oil and gas industry on the economy of the province. The Greater Halifax Partnership is also doing similar work on the economic impacts of the energy sector on the Halifax Regional Municipality. The new Department of Energy will work to ensure that the results of such economic analysis and any new assessments are coordinated, and will support the planning and communication needs in this area.

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Part II

Oil and Gas

4. Training for the Energy Sector

Seizing the
Opportunity
Volume 2

Nova Scotia's Energy Strategy

NOVA SCOTIA

Part II Oil and Gas

Section 4. Training for the Energy Sector

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Training for the Energy Sector

Statement of Principle

Acquiring skills and experience is a key step to enable Nova Scotians to obtain employment in the oil and gas industry.

Offshore oil and gas exploration and development is an increasingly complex business. In an effort to reduce costs and increase safety, more and more work depends on computers and remote telemetry. The increased use of technology has resulted in the majority of the modern oil and gas labour force being described as 'knowledge workers'. This high-tech focus is also matched by increased standards and certification for most occupations in both the onshore and offshore oil and gas industry. Nova Scotians have acquired skills and experience in many aspects of the industry; however, future job and business opportunities will require new skills and increased training and experience. In fact, unless the province has the skills base with which to meet the oil and gas industry's labour market needs and expectations, Nova Scotia will not realize the full economic potential afforded by the offshore. This challenge is particularly acute as many skilled workers in all sectors of the economy reach retirement age.

Government Role and Responsibility

The province is responsible for public education, and it plays a lead role in funding universities and colleges, including the Nova Scotia Community College (NSCC), the province's primary labour market development partner. A well-educated and trained workforce is the foundation of the province's future prosperity. The private sector has prime responsibility for identifying changes it needs in the public training system, and it is responsible for ensuring that employees are properly trained in company-specific processes and procedures. The government will continue to work with industry to identify skills requirements and potential solutions.

Strategy Objectives

- To increase the skills and work experience opportunities of the current and future Nova Scotia workforce.

Actions to Achieve Objectives

2001-2005

- The Department of Energy and the Department of Education will coordinate industry's identification of skills gaps and partnership opportunities with the federal government.
- Support the Department of Education's objectives to increase interest in science- and technology-based courses and education choices.

- Negotiate energy company project development contributions to segregated training funds.
- Encourage the oil and gas sector and the NSCC to work together in establishing targeted training programs to address company-specific development needs. One example is the recent partnership agreement established between NSCC and PanCanadian Energy to prepare technical personnel for their offshore program.
- Concentrate training development efforts in areas that have a high demand or are niche areas that are not being met elsewhere in Atlantic Canada.
- Support training development partnerships that enhance and extend the capabilities of Nova Scotia-based institutions. For example, NSCC's Memorandum of Understanding with the Southern Alberta Institute of Technology (SAIT).
- Ensure NSCC and Nova Scotia universities have the capacity to meet the labour market needs of the oil and gas sector. Specifically, in preparing Nova Scotians for employment in the sector, as well as addressing the ongoing training and development needs of companies within the sector.
- Support industry efforts to expand experience building at all levels from apprentices to professionals to management.
- Hold an Atlantic Canada Petroleum Industry Skills Forum to identify training needs and programs.
- Continue to support the Apprenticeship Training model through active industry participation in program development, training delivery, and apprentice registration/retention.

Links to Energy Strategy Themes

By developing the skills of Nova Scotians and supporting initiatives to gain more skills and experience elsewhere, Nova Scotia will provide the human resource base to encourage the growth of a diversified and sophisticated oil and gas industry. By broadening the skills and opportunities of our people we are working toward **Powering our Economy** and **Securing Our Future**.

Background

Overview

Nova Scotia has had an active offshore oil and natural gas industry since the 1960s. In the early years, many Nova Scotians gained direct experience and skills through working in the offshore on rigs, supply boats and helicopters. With the start of the Cohasset-Panuke oil project, Nova Scotians also started to gain production experience and skills. With planning and development for the Sable Offshore Energy Project in the mid 1990s, Nova Scotians began to gain experience on project construction, design, management, procurement, and fabrication skills.

Training and Education Opportunities

Nova Scotia Community College

The Nova Scotia Community College has played a lead role in preparing Nova Scotians for careers in the province's oil and gas industry. In the current program year, the NSCC system offers more than 80 different courses. The offerings range from Electro-Mechanical Technician and Marine Engineering Cadet to Geographic Information Systems and Industrial Control Technician.

Universities

Many professional skills are gained at the university level in Nova Scotia. For example, Dalhousie University's engineering faculty (DalTech) offers a variety of engineering courses related to the petroleum industry, such as Environmental Engineering, Pipeline Engineering, and Petroleum/Production Engineering. Saint Mary's, Acadia, and St. Francis Xavier Universities all offer degrees in geology. In addition, universities offer a number of programs for careers in fields that support general businesses, including the oil and gas industry. University College of Cape Breton offers diploma and applied degree programs in petroleum technology.

Private Training

In addition to the public education and training systems, the private sector plays a role. In addition to extensive internal training courses, a number of private companies specialize in training activities related to the oil and gas industry (for example, Survival Systems).

Apprenticeship Training

The Apprenticeship System in Nova Scotia serves as a fundamental component in skills development and training for occupations related to the oil and gas industry. Skilled journey persons from over half of the 53 designated trades contribute greatly to labour force requirements in oil and gas infrastructure development, production and maintenance. The apprenticeship model of training and skills development is supported by significant industry input through the 85%-on-the-job-component and is therefore responsive to changes in technology and work processes.

Sable Offshore Energy Project Training Commitments

In one of their commitments in a project memorandum of understanding, the Sable Offshore Energy Incorporated (SOEI) partners agreed to donate the operations training simulator and the accompanying software and course manuals to a fully-accredited Nova Scotia training or educational institution for use in training Nova Scotians. The company continues to make active use of the simulator. Discussions on how to gain maximum training benefits from this resource are underway.

SOEI has reported that it spent more than $18,000,000 in cumulative training and education from 1998 to the end of the second quarter 2001. A significant part of that expenditure is for SOEI internal training, which indicates the important role the private sector plays in training its own workforce.

Work to Establish Skill Requirements in the Nova Scotia Offshore

Several recent studies have investigated which skills are required for future offshore occupations, and the availability of Nova Scotians with the required skills. The 1999 Canadian Association of Petroleum Producers (CAPP) report Estimation of Direct Human Resource Requirements Offshore Exploration and Production Newfoundland and Nova Scotia 2000-2010 uses a simulation approach to project human-resources demand to 2010 for offshore exploration and production. In a recent update, CAPP determined that the high-demand scenario is most valid for planning purposes today.

In 2001, the Nova Scotia Construction Human Resource Sector Council conducted an assessment (*Construction Labour Market Assessment*) of the non-residential construction market to meet the predicted demand for skilled trades people. The Cape Breton County Economic Development Authority, along with its partners Human Resources Development Canada and Enterprise Cape Breton Corporation, produced Cape Breton County Skills Inventory, a limited skills inventory of adults residing in Cape Breton in 2001.

The Atlantic Canada Petroleum Institute has received funding from the Atlantic Canada Opportunities Agency (ACOA) and the Nova Scotia Petroleum Directorate (NSPD) to develop a framework model to be used as an analytical tool for evaluating future labour demand within the region's petroleum industry.

Studies and research such as these form the core of information required to support the ongoing investigation into labour market supply and demand.

Current Nova Scotia Labour Force

The potential labour force of Nova Scotians between the ages of 15 and 65 stands at 752,200. The number of people reporting they are in the labour force working or looking for work currently stands at a record level of 470,600. Of this number, a record 425,600 are employed. This represents a participation rate of 62.6% - a return to the levels found in the 1980s.

There are 45,000 people unemployed in the province, for an unemployment rate of 9.6% overall, compared to a national rate of 7.2%. The regional unemployment rates range from 6.7% in the Halifax Metro Region to 15.3% in the Cape Breton region (all numbers are seasonally adjusted as of September 2001). The labour force has increased over the past three years in the order of 7,000-10,000 people per year, an average growth rate of approximately 1.8%.

These numbers encompass a broad range of industries and skills. An increase in labour demand in a primary industry such as oil and gas exploration, development and production could have a significant and immediate positive impact both directly and indirectly on the Nova Scotia economy. This is particularly true if the province is able to support the unique developmental needs of those currently unemployed or underemployed who are attempting to acquire the skills needed to enter a new sector. The

NSCC has demonstrated its capabilities to help individuals and communities in transition in its work in Guysborough with Secunda Marine, to enable displaced fishermen to make the transition to work in the offshore supply sector. However, it will need support to expand its capacity to help the province realize the full potential of the oil and gas sector.

Public Advice

Training and the need for more skilled workers was a common focus in the public advice on the energy strategy. The need for good planning was stressed. People suggested the province use the time during the regulatory process to carry out needed training. Others noted the potential for an even longer lead time given that after offshore potential is identified, there is a five year window before production takes place. Five years are also needed to complete apprenticeship or post-engineering and technical training.

The type of training was also the focus of advice and opinion. Many suggested the need to focus on jobs associated with production, not just development. Train people here for long-term jobs rather than importing skills for six months, some advised. There was also clear advice to work cooperatively: with other governments, with industry, and with other regions.

Analysis

Oil and Gas Development Requirements

One of the key benefits associated with offshore oil and gas exploration, development, and production is the requirement that first consideration for related opportunities be given to Nova Scotians. This requirement is held for all segments of the offshore industry and the entire exploration-production cycle.

Operators outline their commitment to maximizing employment in the sector. The offshore oil and gas industry requires a broad range of job categories, skills, and experience. These positions require training that ranges from a university degree in a technical field combined with several years of progressive offshore-related experience, to a minimum level of experience combined with introductory training covering basic offshore safety and survival. The industry also offers significant onshore employment opportunities in a number of general business areas. The direction and growth of the offshore energy sector raises the question of skilled labour requirements and capabilities: the supply of and demand for skilled labour.

Demand for Skilled Labour

On the demand side, a clear sense of what the future holds for the nature and timing of offshore activity is required. However, because of the current level of uncertainty with respect to actual discoveries, the demand for labour is also uncertain. Other factors also come into play when assessing future demand in the Nova Scotia offshore and elsewhere around the globe. The relevant variables include:

- the success rate in finding oil and gas reserves in commercial quantities;
- changing market conditions, which influence project timing; and

- technological change, which influences the type and cost of offshore production facilities.

Because it is hard to predict the impact of these unknowns, labour demand is generally analyzed on the basis of general "case scenarios," and then factored into a simulation model. Despite the uncertainty on the number of employment opportunities, some judgment is possible about the nature of future employment. Like other industries, the oil and gas sector is increasingly moving toward automation and high-technology solutions.

For example, when the original Venture natural gas project was planned nearly 20 years ago, the industry was labour intensive and forecast more than 500 permanent jobs for the project. Today, the Sable project, encompassing the Venture gas field and five others, is forecast to need less than half that number on a permanent basis. The technological and productivity improvements are part of the reason why the Sable project was able to proceed when Venture could not.

The move to more remote monitoring and telemetry makes the oil and natural gas industry more like a number of other manufacturing and processing industries. This is particularly true as the industry becomes increasingly high-tech. In a speech on September 8, 2000, David MacInnis, CAPP's Vice-President of Public Affairs, talked about the range of skills required:

> "One of the messages we have to get out to a very computer-literate generation is that today's petroleum industry is a technology-intensive business that uses GPS, remote sensing, and robotics in its day-to-day operations.
>
> Let me give you a few examples. One member of CAPP, Alberta Energy Company, is using technology to remotely monitor its pipelines in Ecuador from its office in Calgary, while another is using the Internet to monitor [certain activities of its] plant operations at a refinery in Scotland.
>
> At Royal Dutch-Shell, so-called "GameChanger" teams of six exploration and production employees meet each week in Houston and Rijswijk in the Netherlands to mull over ideas e-mailed from around the world by other employees. In 1999, four of Shell's top five business initiatives originated from these GameChanger sessions, including one that helped locate some 30 million barrels of oil reserves in Gabon."

In Nova Scotia the use of technology in the offshore is also being strengthened; a number of local companies are playing a role in developing the technology as well as supplying it.

As the private sector is the driver of the demand side of the labour equation, implementation of a successful energy strategy on labour skills issues requires a close partnership between government and industry. Industry's ability to analyze and communicate its own labour needs is critical to government's ability to respond.

Supply of Skilled Labour

On the supply side, there are two key components: the number of existing people in the province available to fill these positions; and the capacity and capability of Nova Scotia's post-secondary training institutions and centres, both public and private, to provide the required skills and knowledge.

The challenge for the provincial public and private education systems will be to ensure not only the capacity and capability to provide core education and training, but also the ability to enhance, upgrade, certify, or re-certify individuals and industry personnel to meet the ongoing needs of the petroleum industry. The province will need to ensure that its primary labour market development partner NSCC and the university system have the capacity to respond to the labour market needs of the oil and gas industry.

Current Nova Scotia Labour Situation

The general outlook for the two immediate projects on the horizon - Deep Panuke and SOEI Tier II - is generally routine. The report on *Nova Scotia's Infrastructure and Manufacturing Capabilities Study* (September 2000), concluded that the skills required to carry out both projects are generally already in place. However, the report also noted several instances where capacity would be tight (for example, the availability of qualified welders and fitters could present a problem, and there is a real shortage of trained supervisory personnel).

The report also did not take into account competing offshore construction activities, such as the finish work on a rig like the Eirik Raude or supply boat construction. Nor did the report forecast the labour impact of additional projects coming on stream before the ones currently on the drawing board are complete.

The province recognizes the need to complete labour demand modelling such as that currently underway by ACPI. This will enable all parties to more quickly respond to market developments. It also recognizes the need to expand our professional engineering and design capacity.

Offshore Multi-Skills Requirement

One identified priority for offshore training is for multi-skill training. Companies such as PanCanadian, Marathon, Shell, Kerr McGee, and Chevron are all moving into the new area of deepwater exploration offshore Nova Scotia. With this new exploration come sophisticated deepwater rigs. One example is PanCanadian Energy and Ocean Rig's partnership to use the Eirik Raude semi-submersible drill rig offshore Nova Scotia. The rig will use the latest technology and sophisticated engineering. Other rigs will also be used in this new offshore exploration effort. A key skills requirement for Nova Scotia in the future is training workers so they can adapt to this new work environment.

Relevant Work Experience

Industry is continuously increasing its requirements for "relevant work experience", which includes specific training beyond the capabilities of institutions and is much more defined than generic offshore and onshore experience. This involves training with a specific company on a specific type of rig or vessel, or training on specialized equipment, often in addition to formal institutional training. This combination of education, training certification, experience and skill sets necessary to perform given jobs or tasks is known as “competency,” and it has become one of the most critical requirements and issues related to employment in this sector.

This issue is significant for Nova Scotia because, although a pool of experienced workers exists, they lack the company-specific experience with the new companies and new technologies that are emerging. Industry itself must identify these gaps and develop plans to fill them. Importing or bringing back workers who have worked elsewhere and acquired the right combination of training and experience will close some gaps. However, industry also needs to act directly through increased involvement in the Apprenticeship System. Some other examples include co-op programs such as the ones funded by the province or industry, or hiring graduates and training them in-house as a longer-term investment. In some cases, institutions may wish to further develop some of their basic-skills training with industry partnership.

Concentration of Training Resources

The wide range of skills required by the industry means that few institutions have the capability to do it all. Some skills are in broad demand and can economically be delivered in a number of places, especially for occupations and skills transferable to other industries. However, there are other areas where economical course delivery may best be served by a larger student population base and an industry opportunity base larger than that of offshore Nova Scotia.

Accordingly, Nova Scotia will explore with Newfoundland and Labrador the identification of these niche skill requirements and the opportunity to coordinate delivery of training to avoid overlap and duplication. This approach also offers the potential of increasing the quality of courses by concentrating teaching resources.

Remote Learning

A number of recently emerging technological developments make custom-designed training viable for remote learning. New opportunities for skills upgrading are coming to the fore in private sector training modules and through NSCC’s Internet learning system known as the Virtual Campus. The offshore industry’s work cycle of three weeks on and three weeks off is ideally suited to take advantage of such approaches. The government will work with industry to explore opportunities to expand this type of learning.

Encouraging Science and Technology

The technical nature of many skills in the energy industry requires a strong science and math background. Without a strong foundation in these core areas, students have little hope in qualifying for the highly paid job opportunities in key areas. Government and industry must work together to demonstrate clearly the opportunities and the basic requirements. Industry support for the government’s agenda of increasing emphasis in these areas would reinforce the validity of the message.

Techsploration

Techsploration is a program dedicated to providing young women from diverse backgrounds with opportunities to explore careers in trades, technical, and technology-related occupations. Starting with grade 9 students, Techsploration assigns them a trade- or technology-related career to research, and matches them with role models working in their assigned field. Over a six-month period, these young women participate in interviews with their role models, and tour job sites. The women learn about the workplace environment, and about the opportunities available in occupations that are often perceived as being off-limits to them.

Skills Canada

Skills Canada is a not-for-profit, dynamic partnership between industry, labour, training, government, educators and students. The mission of the Nova Scotia chapter is "to champion and stimulate the development of excellence in the growth areas of trades and technology, thus increasing the employability of Nova Scotian youth and strengthening our competitive edge in the Canadian and global market-place."

Encouraging Diversity

The need for new sources of labour and skills for the development of the offshore and related sectors opens up new opportunities for women and visible minorities. This issue must be specifically addressed in benefits plans filed with the Canada-Nova Scotia Offshore Petroleum Board and benefits reporting to the board. The province supports efforts to encourage diversity and will work with industry to inform non-traditional groups about career advantages in the oil and natural gas industry. Industry efforts to include aboriginal people in their plans to develop Nova Scotia employment opportunities are also supported and encouraged.

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Part II

Oil and Gas

5. Using Nova Scotia Resources

Seizing the
Opportunity
Volume 2

Nova Scotia's Energy Strategy

NOVA SCOTIA

Part II Oil and Gas

Section 5. Using Nova Scotia Resources

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Using Nova Scotia Resources

Statement of Principle

Gaining the full benefit from offshore development means obtaining significant economic value from natural gas and natural gas liquids through commercial transactions for business and residential use in Nova Scotia and export of the surplus.

Access to natural gas and natural gas liquids (NGLs) provides new fuel sources for the province and increases competition in the fuels industry. Increased competition reinforces the principles of the energy strategy, and should lead to lower prices for heating and process fuels. It also enhances the security of our energy supply.

Natural gas provides the province with an energy source that is required for specific heating and process applications, applications that, to date, have been difficult to locate in Nova Scotia. Natural gas is an economic enabler: it is a building block that makes the province attractive to businesses when considering whether to locate in Nova Scotia, and it gives the province an energy option already available in most other areas of North America. Natural gas liquids also provide the opportunity to develop new industries such as petrochemical manufacturing.

Natural gas is the cleanest-burning fossil fuel available today. Access to natural gas will help Nova Scotia meet its specific environmental obligations regarding air emissions and climate change at the national and international levels.

A new industry is being created to use natural gas in Nova Scotia. The development and operation of a domestic distribution system for gas and the conversion to gas-fired appliances and heating systems provide the potential for increased value for the economy. The operation of such an industry, in many ways similar to the distribution of electricity, requires a high degree of local business involvement and employment in our communities.

The province's priority with respect to gas distribution will be the economic development of the delivery system. The province will encourage gas use in industrial, institutional, commercial, and residential sectors, where access is economic and available.

Government Role and Responsibility

The provincial government is making access to natural gas in Nova Scotia, where it is economic, a high priority. The government will support and facilitate construction and operation of the gas distribution system by the private sector, and ensure an appropriate level of regulatory oversight to protect the public interest. This responsibility is exercised primarily by the Utility and Review Board (UARB) and the Nova Scotia Department of Environment and Labour. The government will promote the growth of the natural gas industry without prejudicing existing energy suppliers.

Strategy Objectives

- To design and administer an efficient regulatory system that ensures the development of a safe and reliable natural gas delivery system.
- To maximize the economic benefits to Nova Scotians from the delivery and use of natural gas.
- To establish policies that enhance access by Nova Scotians to sufficient supplies of natural gas and gas liquids from the offshore.
- To set the stage for commercially viable petrochemical development.

Actions to Achieve Objectives

Local Gas Distribution, 2001 - 2005

- The provincial government will rely on market forces to establish the supply, demand, and pricing of natural gas and gas liquids.
- The provincial government intends to negotiate the terms under which natural gas and gas liquids will be available for delivery to Nova Scotia businesses and homes with each gas project developer in Nova Scotia.
- The provincial government will eliminate the policy requiring a fixed access target of 62% of all households and service to all 18 counties within seven years. The market will dictate the build-out of gas distribution.
- The provincial government will facilitate the development of a municipal tax agreement between the gas distributor and municipalities. It will also establish an assessment policy for energy utilities in the province.
- The provincial government will participate as an active intervener in UARB hearings regarding the issuance of distribution franchises, the development of market rules, and the setting of tolls and tariffs.
- The province will permit bundling of gas service by distributors. This will be subject to a future review by the UARB.
- The provincial government will continue to support further use of the Maritimes and Northeast Pipeline Inc.'s laterals policy.
- The provincial government will implement a plan for early conversion of government buildings to natural gas, where it is economically feasible to do so.
- The provincial government will encourage producer-funded incentives to promote natural gas use in Nova Scotia.
- The provincial government will work with industry to develop and provide information for the public on the use and benefits of natural gas.
- The provincial government will continue to assist in the identification of skills gaps and the training of Nova Scotians to support the delivery and use of natural gas and gas liquids.

- The provincial government will work to streamline its regulatory procedures.

Promoting Industrial Development, 2001 - 2005

- The provincial government will adopt the policy that offshore pipeline routing will be restricted to a limited number of corridors, and that all pipelines carrying Nova Scotia gas or liquids from the offshore will land in Nova Scotia.
- The provincial government will adopt the policy that each project development with significant quantities of natural gas liquids will be planned in such a manner that it contributes to the potential development of a petrochemical industry in Nova Scotia.
- The provincial government will continue to promote unique transportation and proximity advantages, such as the Goldboro bypass option, to industrial gas users.
- The provincial government will promote opportunities for petrochemical development in Nova Scotia.
- The provincial government will implement the new Underground Hydrocarbon Storage Act in order to provide a clearer regulatory approval process for the development of underground gas storage in Nova Scotia.
- The provincial government will be an active intervener to advance Nova Scotia interests at all relevant National Energy Board and Federal Energy Regulatory Commission hearings on facilities, tariffs, and toll applications.

Links to Energy Strategy Themes

Access to secure supplies of natural gas and gas liquids will enhance competition and provide new fuel options previously unavailable, and thus assist in **Powering our Economy**.

The use of natural gas to replace other fossil fuel sources will contribute to reducing the emission of greenhouse gases, particulate matter, and sulphur dioxide, and hence help **Improve our Environment**.

As our natural gas industry expands over the next few years, use of natural gas and NGLs in the province will grow. These industries, both existing and new, will contribute to **Securing our Future**.

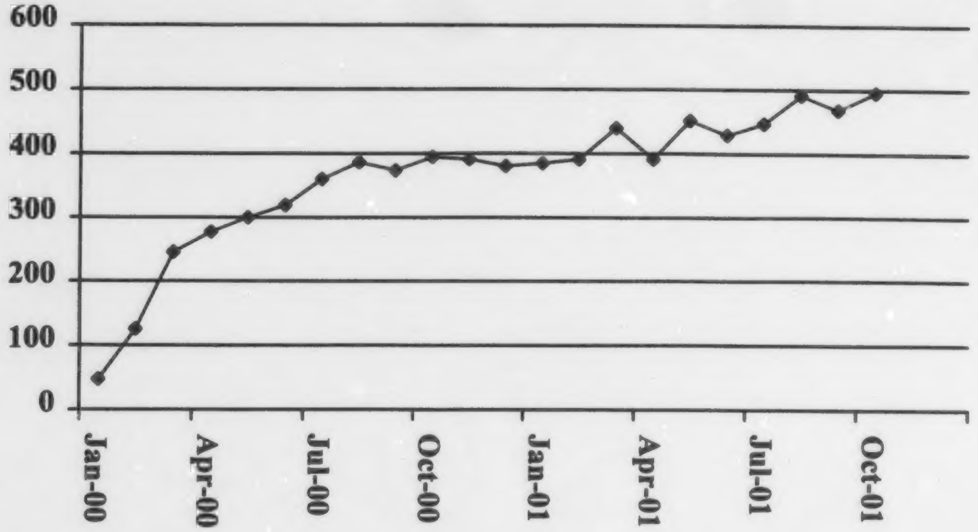
Background

Products From the Nova Scotia Offshore

The existing Sable Offshore Energy project (SOEP) produces several products that could be used in Nova Scotia. The raw gas produced at the offshore platform is shipped by pipeline to the gas plant in Goldboro, where the raw gas is separated into liquids and marketable natural gas (mostly methane with smaller amounts of ethane). The natural gas (sales gas) then enters the Maritimes & Northeast Pipeline Inc. (M&NP) system for shipment to markets in the Maritime Provinces and the northeast United States.

Production has been growing since the project began in December 1999, and has now reached its planned volume of approximately 15.6 million m^3 per day (550 million ft^3/d) of raw gas.

Figure 1. SOEP raw gas production (million cubic metres).



Source: CNSOPB website www.cnsopb.ns.ca

Natural gas liquids leave the gas separation plant by pipeline and are transported to a fractionation plant in Point Tupper. The fractionation plant separates these liquids into propane, butanes, and condensate. The liquids are then transported to market by rail or marine transport. Propane is used as a fuel or for chemical processing, and butane is used in refinery and manufacturing processes. Condensate is used primarily as refinery feedstock.

As additional natural gas projects are developed in the offshore, available quantities of NGLs will increase. When sufficient ethane production is available, and when an ethylene/polyethylene development opportunity emerges, ethane will be removed from the sales gas stream as a separate product. The capability to separate ethane could be added to the gas processing plant(s) before gas reaches the transmission pipeline, or a separate facility (straddle plant) could be built to extract ethane from the sales gas stream.

Current Consumption of Offshore Products

Currently, four Nova Scotia companies have contracted for gas supply from Nova Scotia's offshore: Nova Scotia Power's Tufts Cove generating station, and the StoraEnso paper mill, Canadian Gypsum Company wallboard plant, and Sable Offshore Energy Inc. (SOEI) fractionation plant in Point Tupper. Together, these facilities have contracted to consume up to 81,400 GJ/d (77,200 MMBtu/d) of sales gas from the first phase of SOEP's nominal total production of 560,000 GJ/d (530,000 MMBtu/d). The gas is obtained through direct connection to either the Halifax or Point Tupper laterals, which are part of the M&NP system. These industrial customers are known as anchor loads because their contracts with M&NP provided the revenue necessary to construct and operate these two laterals.

Transportation of Natural Gas

Natural gas is most commonly transported by underground (higher-pressure) steel or (lower-pressure) plastic pipelines. The gas currently produced from SOEP is transported from the Goldboro gas plant by the M&NP high-pressure transmission pipeline. Such transmission pipelines are typically very high pressure and large diameter, and are designed to move large quantities of gas over long distances; the 76-cm-diameter (30 in.) M&NP pipeline operates at 9,930 kP (1,440 psi). Transmission pipelines run cross-country, delivering gas from supply to market areas. They play the same role as high voltage electricity transmission wires, delivering electricity from generation facilities to market areas.

To deliver the gas to the vicinity of the market, smaller-diameter (10-30 cm), medium pressure (1,000-4,800 kP or 150-700 psi), steel distribution pipelines run from the transmission pipeline to the communities to be served. Once gas reaches the vicinity of the market, it usually enters a lower-pressure distribution system, the gas equivalent of the lower-voltage electricity wires running down our streets. This system moves gas to final consumers and terminates at the meter on the side of the building where gas is consumed. These facilities are usually constructed under a monopoly franchise issued by a regulator. Currently, there are no active distribution lines in Nova Scotia, although Sempra Atlantic Gas did lay roughly 15 km of such pipe in the Burnside area.

Natural Gas Pricing

Natural gas prices can be set at a number of points in the delivery system; the gas plant outlet, the outlet of the transmission system, or the burner-tip. While various formulas can be used to establish these prices, the burner-tip price usually reflects four elements:

- the price of the gas commodity at the wellhead or gas plant outlet (e.g., $3.00/GJ) - in Nova Scotia's case, the commodity price includes the wellhead price, the cost of offshore transportation, and the cost of gas processing at Goldboro;
- the cost of using the transmission system, which in the case of M&NP is a toll established by the federal National Energy Board (currently approximately $0.68/GJ);
- the cost of using the distribution system, which in the case of Nova Scotia will be a toll established by the UARB; and
- any marketing or other fees charged by a gas marketer.

Current Gas Distribution in Nova Scotia

The first steps toward establishing a gas distribution franchise in Nova Scotia date back to September 1997 with the passage of the Gas Distribution Act, followed by the regulations to the Act in November 1998. These two documents established the regulatory regime for gas distribution and the requirements for obtaining a franchise. The regulations require access to gas by 62% of the households in Nova Scotia and all 18 counties within seven years of the award of the franchise. The access targets in the natural gas distribution regulations require the distributor to spread the benefits of natural gas throughout the province, regardless of the inherent economics of doing so. Only one distributor, Sempra Atlantic Gas Inc. (a subsidiary of Sempra Energy of California), claimed that it could meet these targets. All other potential distributors consistently said that an economically viable distribution system could not meet these targets.

Following a competitive hearing in late 1999, Sempra Atlantic Gas Inc. (Sempra) was awarded the franchise to distribute gas in Nova Scotia. Design work for the distribution system was undertaken during 2000 and approximately 15 km of distribution pipe were installed in Burnside/Dartmouth at the end of the construction season. Unable to get approval for widespread use of the road rights-of-way for medium-pressure steel pipe, and with natural gas prices at unprecedented levels relative to heating oil during the 2000/01 heating season, Sempra applied to the UARB in July 2001 to surrender or amend its franchise. Because of the fundamental nature of the changes Sempra was seeking, the UARB opened the hearing process to consider alternative applications from interested parties. In August 2001, Sempra decided to surrender its franchise. The UARB held a hearing in December 2001 regarding Sempra's abandonment of the franchise, and a decision is still pending.

Local Benefits From Gas Distribution

The construction and operation of natural-gas delivery systems offers the prospect of significant economic development opportunities. Construction of the pipeline system, supply of goods and services, and operation of the system over many decades will provide significant employment opportunities for Nova Scotians. Many of these positions will represent incremental employment to the economy, while others will be jobs that replace those in other energy industries that compete directly with natural gas in the marketplace.

Similar to employment in the electricity sector, most of the people who install and service natural gas systems will live and work in the communities where the gas system operates. Hence, these systems tend to have very high local-content percentages.

Nova Scotia's regulations on gas distribution require local decision making and, eventually, significant local ownership, as well as commitments to train and employ Nova Scotians. They also require services to be provided from within the province and goods to be manufactured in the province, when those services and goods are competitive in terms of fair market price, quality, performance, and delivery.

Petrochemical Opportunities in Nova Scotia

One reason for seeking access to natural gas liquids in Nova Scotia is to develop a petrochemical industry. Natural gas-based petrochemical manufacturing can be classified into two general categories: those that use methane as the basic feedstock, and those that use natural gas liquids such as ethane, propane, or butanes.

Products such as methanol, nitrogen fertilizers, acrylic fibers, explosives, gasoline additives, and wood resins/adhesives can be manufactured from methane. Plastics (e.g. polyethylene, polypropylene, and polyvinylchloride), aromatics, polyurethanes, acetic acid, and anti-freeze are produced from natural gas liquids.

The government has undertaken several studies to identify opportunities for developing a petrochemical industry. The criteria used in the assessment were raw material availability, presence of key petrochemical infrastructure components in Nova Scotia, investment required, feedstock requirements, supply and demand balance, technology access and turnover, plant complexity, investment requirements, infrastructure, and socio-economic and environmental factors. These studies indicated that the production of methanol, nitrogen fertilizers and ethylene derivatives offered the most potential in Nova Scotia.

Existing Arrangements for Access to Gas and Liquids in Nova Scotia

Natural Gas Liquids

The Government of Nova Scotia has an agreement signed by each of the members of the Sable consortium (Sable producers) that makes natural gas liquids available for use in the province by a petrochemical industry. The June 1999 Petrochemical Supply Agreement commits the Sable producers:

- to fractionate natural gas liquids in the Point Tupper area of Nova Scotia;
- to not dispose of such liquids under any contract longer than two years without acquiring Nova Scotia's permission to do so, or making an equivalent quantity of liquids available in Nova Scotia;
- to remove, or allow third parties to remove, ethane from the natural gas stream; and
- to not guarantee a specific ethane content in any natural gas sold as part of the SOEI project.

Market-based prices and normal operational standards will apply to the liquids covered by the agreement. It is anticipated that future offshore project developers will sign similar agreements. These agreements provide simple, effective, and enforceable mechanisms to achieve the province's objectives of access to natural gas liquids for petrochemical manufacture in Nova Scotia.

If agreement cannot be reached with future producers, the province has the right under the Petroleum Resources Removal Permit Act to require an extensive permitting process for the sale and transport of NGLs outside Nova Scotia. These permits would be limited to a two year time period, effectively achieving the same purpose as the MOU. Producers who sign the MOU are exempt from the provisions of the Act, because the MOU provides for the same degree of certainty with a simpler process.

Natural Gas Access

The province has signed a Joint Position on Tolling and Laterals with SOEI and Maritimes and Northeast Pipeline Inc. (M&NP). This agreement, in part, keeps a total of 10,550 GJ/d (10,000 MMBtu/d) of SOEP gas available for contracting by local gas distribution companies in Nova Scotia for the first three years of the project.

Other commercial entities, including Nova Scotia Power Inc., have made their own commercial arrangements for a supply of natural gas that could also be made available for local distribution. With subsequent discoveries leading to new projects, and increased SOEP production, additional gas supplies will be coming on stream.

The province also has the right under the royalty agreement to take its royalties in gas rather than currency. Such an arrangement could be used to make gas available in Nova Scotia on commercial terms, although it would require further discussions and arrangements with producers.

Public Advice

The public provided clear advice about the use of natural gas and natural gas liquids. The primary benefit that many Nova Scotians are looking for from the offshore is the ability to use the natural gas resource here in the province. Many said they were not expecting residential access to gas in their neighborhoods, but they wanted their communities to benefit economically from the industrial and commercial use of gas. Not surprisingly, municipalities and the public in the Strait of Canso area placed special emphasis on the development of petrochemicals. With such a high priority on resource use in the province, the public strongly supports the provincial position that offshore pipelines must have a landfall in Nova Scotia.

Analysis

Availability of Gas in Nova Scotia

One of the principles guiding the development of the energy strategy is particularly relevant to the availability of natural gas in Nova Scotia: "To the extent possible, the supply, demand, and price of energy products and services in Nova Scotia will be guided by policies that encourage consumer choice and competition."

Offshore projects are extremely capital intensive ($3.5 billion in SOEP's and M&NP's case). To make these projects economic, developers need to produce large volumes, and have access to export markets, in order to capture the economies of scale.

In SOEP's case, plateau production was planned for 560,000 GJ/d (530,000 MMBtu/d) of sales gas. This volume far exceeds consumption that can reasonably be expected by Nova Scotia industry. The SOEI project only became possible because another market in Eastern Canada and the United States was found for gas that was surplus to Nova Scotia's needs. As Energy Probe stated recently: "if it weren't for US demand, you would have no gas development [in Nova Scotia] whatsoever. The fact that there's an export market is your sole and only opportunity to have any kind of development, period" (The Halifax Daily News, October 15, 2001).

Some have suggested that Nova Scotia should restrict exports in order to reserve access for Nova Scotians. That policy choice carries significant risk for the future development of the industry. Exploring at great expense for more gas to sell in an oversupplied Nova Scotia marketplace has no attraction for energy companies, and makes no economic sense. With exploration costs of $35 million to $60 million per well and no guarantee of success, and project development costs of billions of dollars, developers need access to large markets such as those in the northeastern United States. Without access to developed markets, producers would simply stop exploration, and development of large offshore and pipeline projects would cease.

Access to natural gas can be achieved through market forces, just as StoraEnso, NSPI, and Canadian Gypsum demonstrated through long-term purchase arrangements with the SOEP Tier 1 producers. The development of the PanCanadian Deep Panuke project, and the associated expansion of the M&NP pipeline, are being preceded by "open seasons", a mechanism for companies to seek customers for their products and transportation services. Potential gas consumers have the opportunity to enter into firm contracts for gas service.

Where the gas is contracted for export markets, the producer and pipeline company will make necessary arrangements to have transportation capacity built to allow the surplus to be moved to markets beyond Nova Scotia.

With respect to the availability of gas for small consumers, the withdrawal of Sempra has, unfortunately, caused a significant delay in access to natural gas for Nova Scotians. With no distribution franchise in place, it is unlikely that any party will come forward in the near future to contract for gas from PanCanadian or SOEP, or capacity on M&NP, to service small consumers in Nova Scotia.

Because of this delay, the provincial government has a role to ensure that gas will be available for contracting when a gas distribution franchise is operable in Nova Scotia. The government, therefore, intends, as part of its overall consideration of new developments, to negotiate the terms under which natural gas will be made available to Nova Scotia homes and businesses with each gas-project developer in Nova Scotia.

Similar negotiations produced a commitment from the SOEP producers to supply 10,550 GJ/d (10,000 MMBtu/d) for the first three years of the project. The government has also adopted a policy that all pipelines carrying Nova Scotia gas or liquids from the offshore must land in Nova Scotia. In this way, access to the resources from each project will be assured.

The government will implement the new Underground Hydrocarbon Storage Act in order to provide a simplified regulatory approval process for the development of underground hydrocarbon storage in the province. Storage enhances the efficiency and reliability of a gas delivery system.

Petrochemical Development and the Availability of Liquids

The availability and price of feedstocks are crucial components of the decision to locate a petrochemical manufacturing facility. Feedstock can represent more than 65% of the total cost and more than 85% of the variable cost of producing ethylene. For methane-based petrochemicals, feedstock costs can represent 70% to 80% of the cash cost of production (Harry Blair Consultants Report on the Alberta Petrochemical Industry, 2001). Some developers look for niche opportunities, and thus may be able to create value out of the current and planned natural gas and liquids supply. Others are looking for a supply large enough to create a world-scale plant to achieve economies of scale, and thus need additional discoveries for adequate supply of feedstock. Several petrochemical development companies are keeping a watch on the supply situation in Nova Scotia.

Petrochemical plants are capital intensive, and they rely on long-term stable pricing and availability of feedstock. A 500,000 t/yr ethylene/polyethylene plant (mid-scale by recent plant standards) requires more than 30,000 barrels per day of ethane feedstock. Such a plant would require ethane production from the equivalent of two to three SOEI projects. The combined ethane supply from SOEI Tier I and the proposed PanCanadian Deep Panuke project will be insufficient. Moreover, plants as large as 1.5 million t/yr have recently been built or are currently planned for construction.

Alberta did not build its first propane and butane-based facility until 1953, six years after the first discovery of oil at Leduc. It was not until the mid 1970s that investment in ethane extraction, pipelines, and storage established a major ethylene industry in Alberta.

The start-up process from preliminary feasibility assessment of a new petrochemical plant through detailed design, construction, and commissioning takes approximately five years. The planning horizon of petrochemical companies stretches forward longer than 10 years. Assuming new discoveries, Nova Scotia could have adequate feedstock within that time frame for petrochemical development, and the province represents a potential new supply region. The government will promote petrochemical development in Nova Scotia with a focus on ensuring that the medium-to long-term opportunity in Nova Scotia is known and understood by petrochemical companies.

The government is hopeful that, in addition to the Sable Island area, there will eventually be production offshore Cape Breton as well as off the coast of southwestern Nova Scotia. With such expectations, the province must strike a balance between such issues as having all of Nova Scotia's offshore natural gas liquids reach landfall in one location, the project economics of reaching landfall through the closest corridor, and opportunities to widen access for natural gas to new areas of the province.

The government will take the position before future regulatory proceedings that offshore pipelines must land in Nova Scotia before going to market. Routing will be restricted to a few defined utility corridors to concentrate the availability of liquids in a small number of onshore areas and minimize the environmental impact of offshore pipelines. Energy companies will be made aware that Nova Scotia wishes to develop a petrochemical industry and that each project should be planned in a manner such that the provincial objectives are advanced.

The government does not intend to specify locations for landfall or automatically rule out subsea pipelines leaving Nova Scotia for export markets. There is a considerable need for flexibility. The PanCanadian natural gas supply is expected to have far fewer natural gas liquids than SOEI natural gas. New deepwater exploration may establish a very different mix. A number of options may emerge, depending on the sequence of discoveries, the size of the discoveries, the available technology, and the mix of methane and natural gas liquids.

Gas and Liquids Pricing in Nova Scotia

Market-based prices will deliver products at the lowest cost, with the most efficient allocation of resources to find and produce them. Any artificial pricing foregoes revenue and profits for the producers, and royalties for the province. This is likely to lead to a decrease in exploration activities as the energy companies will probably be unwilling to accept increased exploration risk if they believe they will not get a market price for their products. Furthermore, such actions go against the government's principles of market-based competition.

Gas consumers in Nova Scotia have the ability to bypass the gas transmission and distribution systems by locating in the vicinity of gas production facilities. By doing so, significant savings in the cost of gas can be realized. The current opportunity and advantages of locating in the Goldboro area will continue to be promoted by the province.

Promoting Natural Gas in Nova Scotia

It is acknowledged that Nova Scotia's new gas distribution industry faces a number of challenges including:

- consumer reluctance to convert, as a result of a lack of familiarity with the characteristics of the fuel, its delivery, and pricing;
- relatively high capital costs for consumers to convert from heating oil or electricity to natural gas;
- initial high capital costs for the distribution system, which in the early years will not have sufficient customer revenue to offset start-up costs;
- difficult construction conditions in several regions of the province where there is extensive bedrock close to surface;
- existing regulatory systems that either were not designed for gas distribution or have yet to be thoroughly tested through ongoing operations; and
- inability to rely on significant federal subsidies that were applied to the construction of gas distribution assets in other provinces.

The province recognizes the significant benefits that could be achieved from consuming our own gas and liquids and will actively support the introduction of a new competitive and environmentally friendly fuel source for business and individuals.

Government Support of the Gas Distribution Franchise

The government will promote the long-term benefits of using natural gas in Nova Scotia. It will lead by example by converting its own buildings, where it is economical to do so. The government will also promote a better understanding of this new industry by working with producers and the distributor to develop and provide information to the public.

Municipal Tax Agreements

Local gas distribution is subject to assessment for property tax purposes. Most utilities in the province and elsewhere in Canada are taxed at a municipal level based on assessments other than market value. The reasons for these differences are largely related to the economic benefits to a community that result from the introduction of these facilities, and the limited public services required for these types of capital assets, which are mostly underground. To ensure fairness and facilitate the achievement of long term economic objectives by the distributor, many jurisdictions use taxation principles that take into account the low revenue stream in the early days and the rise in revenues as more customers come on line.

The government will continue to work with the Union of Nova Scotia Municipalities (UNSM) on a common approach to gas distribution taxation, which recognizes the service and economic benefits of gas distribution infrastructure and the need to maintain a fair and reasonable cash flow to municipalities. The government will also integrate the property taxation policy for gas distribution into one for all energy utilities in the province.

Municipal Operating Agreements

The government will work with the UNSM to develop a common code of practice for distributing natural gas in municipalities in Nova Scotia. This will help the establishment of new natural gas distribution facilities by limiting the potential for multiple standards and codes governing how and where to lay pipe in municipalities. This may be a particular issue for municipalities that have no experience with gas, and that might otherwise have to obtain expensive advice. There is ample precedent for such operating codes; these practices have already been long established elsewhere.

Access Targets

The buildup of natural gas service takes many years. Long term viability is dependent on the continuing competitiveness of the system. In Nova Scotia, customer demand will be the primary factor driving private-sector construction and service delivery. Therefore, artificial access targets will no longer be in effect. However, safeguard provisions will be introduced so that, in the case that a franchisee does not plan to serve an area, others can apply for distribution rights if they are willing and capable.

Maritimes and Northeast (M&NP) Lateral Policy

The provincial government recognizes the contribution the M&NP laterals policy, approved by the National Energy Board (NEB), can make towards development of natural gas markets in the Maritime Provinces. The lateral policy was an important factor in the construction of the Point Tupper and Halifax laterals, because it allowed these laterals to be rolled into the overall transmission system for tolling purposes. Thus, the toll is the same off the Halifax or Point Tupper lateral as it is off the M&NP mainline. The province will work with the gas distributor(s), before all relevant NEB proceedings, to advance the position that the fundamentals of the existing M&NP lateral policy must endure.

Bunding of Gas Sales and other Products and Services

Bundling is the ability of the gas distributor to offer sales of gas and other associated products and services along with its distribution service.

In this greenfield environment, the province believes bundled offerings will aid the initial development of the distribution system. It also allows the local distribution company (LDC) to compete equally with existing energy sources. As an example, an oil distributor is able to offer its customer not only the delivery of heating oil, but also the sale of the heating oil commodity as well as equipment sales and service. Similarly, NSPI offers related sales and service offerings to its customers along with the delivery and supply of electricity.

The province will allow the LDC to provide a bundled offering to customers during the initial development of the distribution system. The UARB will have discretion regarding the timing for review of this policy, based on market conditions, but allowing bundling for a development period will be reviewed no later than the end of year seven of the LDC's franchise. Any interested party can request an earlier review by the UARB.

Conversion Incentives

New projects will be expected to consider how they can contribute to the expansion of gas distribution to a wider market of business and individuals. The province, in its discussions with producers, will encourage the use of producer - sponsored initiatives to aid in the expansion of gas distribution.

Regulatory Efficiency

Along with technical and financial challenges, construction and operation of a gas distribution system faces a broad range of regulatory requirements including health and safety, environment and oversight of construction, operation, rates, etc. Regulatory oversight in no way diminishes the gas distributor's full responsibility for health, safety, environment, system reliability, etc.

The gas distributor and the province will work together to identify and implement solutions that preserve regulatory objectives while allowing the development and operation of an economic and efficient gas distribution system. Safety, reliability, and the public interest cannot be comprised, but excessive regulation is in no one's interest. The province will work with the gas distributor and the regulator to make the regulatory system efficient and effective. It will also work to establish standard practices for dealing with water crossings, bedrock, vegetation clearance and disposal, and protection of archaeological resources.

Protecting Provincial Interests

The federal National Energy Board regulates the construction, operation, tariffing, and tolling of interprovincial pipelines such as the M&NP pipeline. The Federal Energy Regulatory Commission has a similar role in the U.S. The province will take an active role before such agencies to defend the interests of Nova Scotians when pipeline issues are being decided. For example, tolling decisions on the M&NP pipeline directly affect the returns that Nova Scotia's offshore producers receive and hence directly affect the royalties flowing to Nova Scotia. The province will actively participate through its new Department of Energy in hearings and any other regulatory opportunities requiring input, to ensure that decisions reflect the importance of these issues to Nova Scotians.

The UARB is also an important regulator of the oil and gas industry. In particular, the UARB has significant authority over the development and operation of downstream natural gas distribution. It is important that the regulator clearly understand the position of the province with respect to its regulatory decisions. Without involvement by the province, the UARB will be determining issues, having perhaps heard only from parties with a direct economic interest. The province will participate in UARB proceedings to ensure as complete a record as possible, in order to assist the Board's deliberations.

Gas Storage

Underground storage facilities enabled by the Underground Hydrocarbon Storage Act will help improve the security of supply for the gas transportation system and allow the pipeline delivery system to operate more efficiently. Regulations to this act will be developed.

Training for Natural Gas Distribution

The natural gas industry requires new skills for technicians who want to install pipe and heating equipment or appliances. Training programs have already been established to meet the anticipated demand. There are also new skills required for gas plant and fractionation plant operations, and eventually an increase in petrochemical industry skills will be required. The government will continue work with industry and the education system, including the Nova Scotia Community College, to identify skills gaps and train Nova Scotians to support the delivery and use of natural gas and gas liquids.

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Part II

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Onshore Exploration

Statement of Principle

Nova Scotia has potential for discovery of onshore conventional oil and gas, and coalbed methane resources. The province will make every effort to provide a better level of understanding of this resource and a climate conducive to new exploration activity in the province.

The Carboniferous basins of eastern Canada have been known for many years to contain seeps and shows of hydrocarbons, and include sedimentary rocks capable of containing hydrocarbons. This has led to a long history of sporadic exploration resulting in numerous petroleum shows but, until recently, little success. Past production and a recent discovery in New Brunswick have increased industry activity onshore Nova Scotia and New Brunswick. Currently, Nova Scotia has approximately 1.6 million hectares under active petroleum agreements with five different operators. Over the next several years approximately $15 million is expected to be spent exploring for onshore petroleum resources.

The key to encouraging increased exploration activity in these sedimentary basins is to increase the knowledge of Nova Scotia's potential in the petroleum industry. With increased activity, new geological data will be obtained, improving the probability of further exploration success.

Government Role and Responsibility

The Petroleum Resources Act regulates oil and natural gas as well as coalbed methane (CBM, also known as coal gas) activity in the onshore Nova Scotia area. This legislation deals with all matters of onshore petroleum exploration and development activity in the province and is administered solely by the provincial government. The onshore region comprises the actual land mass of the province together with certain submarine areas such as the Minas Basin, St. Georges Bay, and Chedabucto Bay. The resource is owned by the people of Nova Scotia, and developed by the private sector on behalf of the resource owner.

The Nova Scotia Petroleum Directorate and the Department of Natural Resources have resident expertise in matters related to petroleum and sedimentary basin geoscience, and maintain a geoscience database to provide support for all petroleum activities. They also ensure that appropriate knowledge is available for public policy advice.

Strategy Objectives

- To encourage continued exploratory activity for oil and gas and coalbed methane in the onshore Nova Scotia area.

Actions to Achieve Objectives

2001-2005

- Promote the onshore resource potential through increased participation at oil and gas trade shows, presentations at technical conferences, and meetings with petroleum industry clients.
- Continue to work with the province's interdepartmental One Window Standing Committee to coordinate the onshore regulatory approval process.
- Maintain an up to date geoscience database and develop in-house geoscientific expertise on the Carboniferous and younger sedimentary basins.

Events that may Result in Strategy Adjustments

As discoveries are made onshore, the province may need to: (1) perform a new resource assessment and use this information to estimate potential hydrocarbon resources, and (2) re-assess the onshore royalty regime.

Links to Energy Strategy Themes

Establishing the extent of our resource potential will enable us to more properly assess the longevity of the oil and gas industry in Nova Scotia. With this information we can refine public policy and be in a better position to ensure that appropriate development of our onshore resources plays a role in **Powering our Economy**.

Background

Conventional Oil and Gas

Exploration in the onshore area first began in 1869 with the drilling of a well in the Lake Ainslie area of Cape Breton Island. More than 100 wells have been drilled since that time and, though none has resulted in a commercial discovery, at least a third of the wells have contained hydrocarbon shows. Since the late 1940s, less than three thousand kilometres of seismic data have been acquired in the onshore. Seismic exploration has been carried out in Inverness, Antigonish, Pictou, Hants, Colchester, Cape Breton, Victoria, Richmond, and Cumberland Counties, as well as the Bras d'Or Lakes and several of near-shore bay areas.

Notwithstanding exploration activity over the past 135 years, the geologically attractive basins onshore Nova Scotia remain under explored. Areas that are prospective for hydrocarbons in onshore Nova Scotia are still not well understood, even after extensive geological mapping and basin analysis by the Department of Natural Resources, the Geological Survey of Canada, and the Nova Scotia Petroleum Directorate. Geological maps are available for most prospective areas at detailed scales that can be used by industry. Exploration wells, borehole information, geological mapping, and seismic data collected by both private and public sectors all contribute to the understanding of the sedimentary basins and the possible location of hydrocarbon plays.

Significant new interest has been generated as a result of recent discoveries in southern New Brunswick. The McCully gas discovery near Sussex was announced in late 2000. This discovery is still being tested and occurs in a geological setting similar to parts of western and central Nova Scotia. Increased infrastructure onshore Nova Scotia, resulting from offshore gas development, is also generating new interest.

Today, exploration activity is on the rise. Most of the recent activity has focused on geological studies followed by regional seismic programs, and there has been a modest amount of drilling. More than 200 km of seismic data were acquired in 2000, and more than 500 km in 2001. More seismic work is expected to be secured in 2002 to fill in gaps in previous programs, and for several new exploration agreements throughout the province. In 2001, three exploration wells were drilled, and as many as three more wells may be drilled in 2002. While more seismic data acquisition is expected over the next several years, it is expected that there will continue to be significant exploration drilling to test prospects identified through the analysis of new seismic data.

Coalbed Methane

CBM is an increasingly important source of natural gas in coal basins in many parts of the world. In the United States, estimates of CBM reserves range from 275 to 650 trillion cubic feet. CBM accounts for some 15% of conventional recoverable U.S. gas reserves and production, largely from the San Juan Basin in southwestern Colorado and northwestern New Mexico, and from the Black Warrior Basin in Alabama, which now represents for 5-6% of total U.S. natural gas production.

Much of Canada's CBM reserves occur in the western Canadian sedimentary basin. The Canadian Gas Potential Committee recently estimated in-place CBM in western Canada to total 275 trillion cubic feet (tcf), of which 260 tcf may be recoverable under optimum conditions. Pilot studies are underway in Alberta to test the production of CBM while sequestering carbon dioxide (CO_2). Officials in the Alberta and federal governments anticipate an increasing demand for CBM as reserves of conventional natural gas decline in the coming decade.

Although there is considerable published research documenting the geology of Nova Scotia's coal resources, there has been less work done specific to its CBM content or to the recoverability of this gas. The potential for CBM has been recognized for many years. In the 1970s, Algas drilled 29 exploratory wells, two of which were able to sustain flows of gas. Since 1994 there has been a resurgence of interest in onshore CBM, most recently by Amvest and PanCanadian. An exploration agreement in the Cumberland Basin and a production agreement in the Stellarton Basin are in place. Recent production testing in the Stellarton area is expected to continue over the next three to five years. Some industry estimates suggest that Nova Scotia's CBM resource may measure in the trillions of cubic feet. Continued exploration and development activities are needed to better define the size of this resource.

Royalty Regime

The royalty regime applicable to onshore production of gas, oil, and CBM is set out in the Petroleum Resources Act Regulations. The royalty applicable to production of conventional oil or gas is set at 10% of the value of the petroleum produced at the wellhead. The first development project under a given exploration agreement receives a two-year royalty holiday. For production of CBM, the royalty rate is set at 5% of the value of the coal gas produced at the wellhead. There is no royalty holiday for CBM production.

Rights Issuance Process

The rights issuance process for onshore lands is governed by regulations under the provincial Petroleum Resources Act. Whether for CBM or conventional oil and gas, petroleum rights are awarded through competitive bidding. The first step in this process is the nomination of lands by industry. Once land parcels are nominated, the parcels are reviewed, any land issues are addressed, and the resulting lands are issued under a Call for Exploration Proposals. Each bidder must satisfy the Minister that it has the financial and technical capability to undertake the work included in its proposal. Once the Minister is satisfied, the bidder proposing the highest work expenditure receives the exclusive right to explore in a designated area for a set period of time.

Regulatory Coordination

In the Spring of 2000, the Petroleum Directorate, the Department of Environment and Labour, the Department of Natural Resources, and the Department of Transportation and Public Works entered into a memorandum of understanding (MOU) regarding the efficient coordination of onshore petroleum responsibilities in the province. The MOU required the establishment of a One Window Standing Committee to manage the coordination.

The One Window Standing Committee meets when onshore operators propose exploration or development programs. The meetings include government and industry participants, and it is at these meetings that industry is made aware of potential labour, environment, and sensitive area issues, enabling it to efficiently finalize its exploration program plans. This approach eliminates unnecessary delays in approvals by government and is viewed by industry as progressive and efficient.

Industry and Opportunity Promotion

The Petroleum Directorate promotes the resource potential of the onshore through technical discussions at local, national, and international forums with geoscientists in industry. These forums include oil and gas shows, international prospect exchanges where the potential of areas around the world are presented and reviewed, technical conferences, and one-on-one technical presentations.

Public Advice

Much of the public focus on Nova Scotia's oil and gas potential has been on the offshore. With the discovery of some onshore resources in the Atlantic provinces, and the rise in exploration in Nova Scotia, public attention is expected to rise. However, at the time of the strategy consultation, advice about policy direction for the onshore was minimal and largely restricted to industry, Regional Development Authorities, and certain special interest groups who advised us to continue to encourage exploration in order to more accurately determine onshore potential.

Analysis

Current Activity Level

The interest in onshore petroleum exploration in the Atlantic provinces is at an all-time high. The recent exploration success in New Brunswick and discoveries of oil and of gas in Western Newfoundland have caused industry to re-examine Nova Scotia as a place to invest in exploration.

Exploration necessarily precedes development. To establish whether commercial quantities of hydrocarbon resources exist onshore, exploration must be encouraged. One proven way to encourage activity is through the promotion of the oil, gas, and coalbed methane resource potential. It is also important to have a regulatory environment that is flexible, yet establishes clear rules and regulations. A seismic program in Nova Scotia costing over $5 million was completed in 2001, and a well is currently being drilled.

Western Canada Sedimentary Basin

Compared to western Canada, Nova Scotia's onshore industry is a frontier area. The geology and area of onshore Nova Scotia is such that the resource potential is a small fraction of that in western Canada. For example, 15,000 wells were projected to be drilled in Alberta in 2001, compared to the three that might be drilled in Nova Scotia next year. However, Nova Scotia has benefited from the mature state of the industry in North America, as U.S-based, and western Canadian explorers are actively seeking other petroleum basins to explore.

Royalty System

Comparison with Western Canadian Royalty Regimes

The Nova Scotia service and supply sector for the industry is much less developed than that in western Canada, which makes exploration costs higher. In addition, the 3D geological model of the sedimentary basins in eastern Canada are not as well understood as those in the western Canada sedimentary basin. The lack of any commercial discovery means the reward for exploration investments to date has been negligible. As a result, Nova Scotia is seen as a more expensive and higher risk area to explore than western Canada.

Table 1. Comparison of Nova Scotia's onshore royalty regime and those in Western Canada.

Province	Royalty rate	Notes
Alberta	15-30% of wellhead value	depends on price
British Columbia	15-25% of wellhead value	depends on price
Saskatchewan	20-40% of wellhead value	depends on price
Nova Scotia	10% of wellhead value* 5% of wellhead value**	

*for conventional oil and natural gas
**for coalbed methane

Rights Issuance Process

To compensate for the higher risk of the area, and until exploration success is achieved, Nova Scotia will continue with a policy of work expenditure rights issuance and a competitive royalty regime. Exploration success will ultimately reduce geological risk, spark an increase in the size of the service and supply sector in Nova Scotia, and ultimately reduce the costs for industry.

Information Dissemination

An important tool in promoting the onshore potential of the province's sedimentary basins is a comprehensive, up-to-date geoscience database. This database is shared by geoscientists in the Petroleum Directorate, the Department of Natural Resources, and the Geological Survey of Canada. This is an essential tool for the province's geoscience professionals to demonstrate the geological conditions in which hydrocarbon plays might exist, and to help industry efficiently identify and explore in the areas of the highest potential. The province will continue to maintain a geoscience database sufficient for our hydrocarbon exploration needs, including up-to-date geological maps, well logs, cuttings and cores, and resident expertise in petroleum and sedimentary basin geology. The province will also continue to increase in-house expertise on all aspects of the Carboniferous basins in Nova Scotia.

The province will continue to promote Nova Scotia's onshore petroleum potential through analysis of exploration data, presentations to industry at technical forums, participation in local, national, and international trade shows, and one-on-one meetings with geoscience professionals in industry. Nova Scotia will maximize the interest in onshore hydrocarbon potential by continuously making new information and analysis available.

Regulatory Efficiency

The One Window Standing Committee was created with the sole purpose of streamlining government regulation of onshore oil and gas exploration activity. This committee will continue to meet to coordinate the regulatory activity.

Coalbed Methane

Exploration and development of CBM prospects in the Stellarton area and the Cumberland Basin are expected to continue. Two companies are actively pursuing CBM in the province, and it is expected that continued promotion of the CBM potential will attract additional explorers to the province.

The successful commercial production of CBM depends on markets and discovering economic reserves. As CBM is produced at pressures far below those in the Maritimes and Northeast pipeline, compressors would be necessary to allow access to this pipeline, thus increasing the cost. Nevertheless, interest in CBM is increasing in the province, and there are local markets that could be developed.

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Effective and Efficient Regulation

Statement of Principle

Where regulation of oil and gas exploration, development, and transportation is required, it will be conducted in a regulatory environment that is as clear, predictable, and efficient as possible.

Nova Scotia wishes to encourage the development of a vibrant and growing oil and gas sector. The province competes globally to attract significant amounts of private capital necessary for the growth of this industry, particularly when it comes to developing offshore oil and gas fields. An efficient regulatory system decreases investor uncertainty, reduces costs, and improves project cycle time, all of which add significantly to competitiveness and Nova Scotia's ability to attract investment capital.

Because of public resource ownership and the complex nature of the marine ecosystem, the oil and gas sector faces a higher than normal requirement for public interest regulation. To satisfy this level of public interest, the regulatory system must be effective in achieving high standards.

Government Role and Responsibility

Nova Scotia's offshore area is under joint management by both Nova Scotia and the Government of Canada. The agreement for joint management was established in the Canada-Nova Scotia Offshore Petroleum Resources Accord of 1986 and put into law in the Canada - Nova Scotia Offshore Petroleum Resources Accord Implementation Acts of 1988.

Both governments have the responsibility to help ensure that the oil and gas resources are explored for and developed in a manner that maximizes the recovery of the resource without compromising environmental protection or safety standards. In attempting to minimize the level of overlap and duplication, this shared jurisdiction imposes unique challenges to the regulatory system.

In the offshore area, regulatory responsibility has been delegated to a number of agencies, most prominently the Canada-Nova Scotia Offshore Petroleum Board (CNSOPB).

On land, the province has sole jurisdiction over oil and gas activity, except in those areas where a national interest can be demonstrated (for example, interprovincial pipelines such as the Maritimes and Northeast Pipeline fall under the federal National Energy Board). Primary responsibility for provincial regulation on land falls to the Utility and Review Board (UARB) and the Department of Environment and Labour.

Policy direction and fundamental decisions are the responsibility of the relevant ministers in the federal and provincial governments.

Strategy Objectives

- To eliminate areas of unnecessary regulation.
- To eliminate areas of regulatory overlap and duplication.

- To create a regulatory system that effectively and efficiently protects the public interest in areas such as health, safety, the environment and efficient resource use.
- To develop a process through which the Offshore Accord can facilitate an effective and efficient administrative system for oil and gas.

Actions to Achieve Objectives

2001-2005: Offshore

- Initiate discussions between the province, Natural Resources Canada, the CNSOPB, and the Canadian Association of Petroleum Producers (CAPP) about the issues identified in CAPP's Regulatory Issues Matrix. This review should focus on designing improvements to processes and realizing outcomes.
- Work with the federal government and the CNSOPB to:
  conduct a review of the effectiveness of the regulatory requirements in the offshore area;
  have the CNSOPB report its views and recommendations to the federal and provincial governments; and
  reach agreement between the levels of government on which recommendations will be implemented and the plan for such implementation.
- Prepare a comprehensive review of benefits-related information presently submitted to regulators, the federal government, and the province. Identify clear reporting objectives, gaps, overlap, and unnecessary duplication. Using the results of this assessment, streamline and refocus the reporting of such information to governments and the public.
- Take immediate steps to reduce the level of provincial regulation of the planned Deep Panuke project. Such steps will include reducing the province's regulatory role in those areas adequately covered by joint or federal agencies.
- Sign a memorandum of understanding between the provincial Department of Environment and Labour and the Canadian Environmental Assessment Agency (CEAA) designed to minimize the level of overlap between the two environmental agencies in both the onshore and the offshore areas.
- Participate fully in consultations to establish the rules under which the existing environmental approval processes and exploration activities will undergo transition to the CEAA process. The province will work with the CEAA to ensure that this transition does not impose unnecessary restrictions on the operators in the offshore area.
- Continue the ongoing process of direct consultation with the Province of Newfoundland and Labrador on finding solutions to common regulatory issues.
- With the federal government and the Province of Newfoundland and Labrador, develop new legislation and regulations on offshore health and safety.

2001-2005: Downstream

- Work with the Union of Nova Scotia Municipalities, municipalities, and the gas distributor(s) to develop a standard municipal operating agreement.
- Work with the local gas distributor(s) to develop a series of standard practices for dealing with issues such as water crossings, sulphide-bearing materials (acid rock), vegetation clearance and disposal, and protection of archaeological resources.
- Rely primarily on market forces to establish the supply, demand, and pricing of gas and liquids in downstream markets.
- Implement the Underground Hydrocarbon Storage Act to provide a simplified and expedited approval process for the development of underground gas storage in Nova Scotia.

2001-2005: Government Actions

- Prepare a new Energy Act, which will consolidate sections from several existing pieces of legislation (e.g. NSP Privatization Act, Gas Distribution Act, Public Utilities Act) into one act. This will clarify and simplify the legislation applicable to energy in Nova Scotia.
- Establish a Department of Energy to be responsible for provincial leadership on energy issues.
- Ensure that the Department of Energy and the UARB have sufficient resources to undertake their tasks.
- Provide the CNSOPB with the financial and human resources necessary to allow the Board to take a larger role in government regulation in the offshore, thus reducing the duplication of separate federal and provincial regulation.

Events that may Lead to Strategy Adjustments

- Once the CNSOPB review of offshore regulation is complete, work with the federal government to implement the proposed changes.

Links to Energy Strategy Themes

By ensuring that the regulatory system is as effective as possible, the broad interests of the public in areas of health, safety and environment are safeguarded, and thus help **Secure our Future**.

An up-to-date legislative and regulation regime will permit regulators to administer a regulatory system that is as efficient as possible. Such efficiency is in the best interests of the oil and gas industry, and thus should improve the competitiveness of the offshore. Improvement to our competitive advantage helps attract investment and hence helps **Power our Economy**.

With the appropriate and effective regulatory tools, regulators can carry out their responsibilities to protect the public interest in the energy sector and carry out the aim of the energy strategy to **Improve our Environment**.

Background

Regulatory Scope

Regulation of the Nova Scotia oil and gas sector occurs primarily in three areas: onshore exploration, offshore exploration and development, and onshore gas distribution.

Onshore exploration is regulated under the jurisdiction of the province. The awarding of exploration rights and the regulation of exploration activity are the primary functions currently carried out. The province also reviews environmental and safety matters.

The offshore oil and gas industry is one of the most heavily regulated industries in the province. The Atlantic Canada Petroleum Institute's ("ACPI") Regulatory Roadmaps Project identifies 21 federal and provincial regulatory agencies with jurisdiction over oil and gas activities, 24 separate statutes, 32 sets of regulations, and 18 guidelines employed by the regulators.

The following areas are regulated:

1. drilling programs, 2. approval of wells, 3. approval of diving programs, 4. exploration licenses, 5. declaration of significant discoveries, 6. declaration of commercial discoveries, 7. production licenses, 8. development plans, 9. authorization of development programs, 10. authorization of production, 11. authorization of well operations, 12. decommissioning approval, 13. environmental assessment prior to exploration and development, 14. authorization to conduct activities under the *Fisheries Act* and the *Navigable Waters Protection Act,* 15. approval to dispose at sea, 16. pipeline approvals, 17. inspection and approval of vessels, 18. authorization of foreign vessels, 19. authorization of foreign workers, and 19. benefits plan approvals.

The distribution of natural gas is a regulated monopoly function under the jurisdiction of the province. The primary areas of oversight are the awarding of franchises, the setting of tolls and tariffs, and the construction and operation of intraprovincial pipeline systems.

Regulatory Rationale

Offshore

The significance of the regulatory effort is not surprising. Exploration for and extraction of a non-renewable public resource requires public oversight, particularly in an environmentally sensitive and potentially dangerous work environment. In addition, the east coast offshore is unique in Canada because jurisdiction is shared between the federal and provincial governments.

This joint jurisdiction and responsibility has inevitably led to overlap and duplication. In some cases, this has resulted in oversight of the same facility or activity by a federal regulator, a provincial regulator, and the joint regulatory agency, the Canada-Nova Scotia Offshore Petroleum Board (CNSOPB).

Nova Scotia's offshore industry is in its infancy. The province needs more exploration to better define the resource potential and, assuming additional petroleum reserves are identified as expected, the Nova Scotia economy will benefit from development of these reserves. Exploration and development require huge expenditures, and Nova Scotia as a resource region has to compete on the world stage for this investment. A regulatory system that is both efficient and effective will be better positioned to reduce uncertainty and lower risk for all parties, and make our business investment climate more competitive.

Onshore

Many of the reasons for regulating the offshore also apply to Nova Scotia's onshore industry. The need for a competitive investment climate also applies. As jurisdiction lies solely with the province, the issue of regulatory overlap and duplication tends to be less significant.

Onshore Gas Distribution

Because of the high cost of running pipe to households and businesses, local gas transmission and distribution tends to be a monopoly and as such must be regulated in the public interest. Public interest is also present with respect to safety and environmental issues. The initial policies and processes put in place to choose a natural gas distributor resulted in the selection of Sempra Atlantic Gas (Sempra), a subsidiary of a major energy company in the United States. However, for a number of reasons, including the unprecedented closure of the gap between natural gas and light fuel oil prices, Sempra was unable to establish a viable business model. Sempra Atlantic Gas has applied to surrender its franchise.

Regulatory Authorities

Canada-Nova Scotia Offshore Petroleum Resources Accord

The Nova Scotia offshore oil and gas industry is regulated primarily under the legislative authority contained in the Canada-Nova Scotia Offshore Petroleum Resources Accord Implementation (Nova Scotia) Act and federal mirror legislation.

The primary regulatory functions of the CNSOPB include:

- ensuring safe working conditions for offshore operations,
- permitting and licensing of offshore exploration,
- facilities construction and production,
- environmental protection of offshore petroleum activities, and
- monitoring offshore industrial benefits and employment.

National Energy Board

The National Energy Board (NEB) is responsible for the regulation of construction, operation, and tolls and tariffs of pipelines that cross interprovincial or international boundaries; the exporting and importing of oil and natural gas; and the exploration and development of oil and gas resources in frontier areas.

The primary function of the NEB in Nova Scotia is the regulation of construction, operation, environmental protection, and the tariff and tolls of the Maritimes and Northeast Pipeline Inc. facilities running from Goldboro to the New Brunswick border, as well as the laterals to Halifax and Point Tupper.

The NEB has also taken on a role in regulation of offshore pipelines and the gas plant in Goldboro. These are areas of overlap with respect to the responsibilities of the CNSOPB and the UARB.

Canadian Environmental Assessment Agency

The Canadian Environmental Assessment Agency (CEAA) is a federal agency reporting directly to the Minister of the Environment. Environmental assessment is a planning tool used (1) to identify the possible adverse effects of development projects on the environment, and (2) to recommend measures to reduce or eliminate these effects.

Environment Canada

In January 2001 the federal government announced that the CNSOPB had been designated a federal authority under the Canadian Environmental Assessment Act (the Act). The move ensured that when land is leased by the CNSOPB to industry to enable oil and gas development projects to proceed, such projects will be subject to an environmental assessment under the Act. The regulations currently apply to oil and gas development projects.

The federal government is currently working on other regulatory amendments that will require oil and gas exploration projects (such as seismic activities and exploratory wells) under the jurisdiction of the CNSOPB to be subject to environmental assessments under the Act. The federal government has committed to a regulatory amendment process that will include extensive consultations with all stakeholders.

The Nova Scotia Petroleum Directorate

Onshore petroleum exploration rights and activities are controlled by the Nova Scotia Petroleum Directorate. To date, exploration activity has not yet resulted in sufficient discoveries to justify production.

Nova Scotia Utility and Review Board

The Utility and Review Board (UARB) is responsible for approval of intraprovincial pipeline construction and operation, and for setting pipeline rates, tolls, charges, and terms of service. The UARB is the primary regulatory body of the local gas distribution system network.

Offshore Occupational Health and Safety Gaps

Nordic Apollo Incident

On April 15, 1999, a worker on board the oil tanker *Nordic Apollo* was fatally injured when he was pinned in a watertight door in the engine room while the ship was stationed off a production platform. The Nova Scotia Department of Labour investigated the accident in cooperation with the CNSOPB. This cooperative approach was adopted because the federal-provincial Accord Acts partially displaced the provincial Occupational Health and Safety Act.

The provincial investigation recommended prosecution. After consulting with the Public Prosecution Service, the province concluded that the facts of the accident took it outside the province's jurisdiction. The Department of Labour did not proceed further, and the file was referred to CNSOPB with the province's recommendation. The CNSOPB decided not to prosecute. Its decision was partially based upon the fact that the Accord Act and the Board regulations did not give them authority to do so.

The discovery of this gap led to a federal-provincial effort (later joined by Newfoundland) to develop new legislation on offshore safety and amend the Accord Acts in three locations with the exact same wording. The parties have agreed to the principles and approach to be used. Detailed legal drafting is now underway, to be followed by extensive consultation with labour and industry groups prior to passage by legislatures in Nova Scotia and Newfoundland, and in the Parliament of Canada.

Public Advice

The public's knowledge of petroleum regulation is understandably general. The issue is most often reflected in concerns about the relationship between the fishing and oil industries and the common belief that governments and regulators are not obtaining sufficient local benefits from the oil and gas industry. However, during the consultation process the issues of duplication, overlap, and efficiency were a frequent focus of the energy companies and the service sector in Nova Scotia.

Regulatory efficiency and effectiveness is a key driver in keeping a competitive environment for oil and gas industry investment, and in the ability of the province to obtain early economic benefits from the development of reserves and distribution of energy.

Analysis

Public Interest

Regulation is absolutely necessary to protect the public interest in the offshore area, particularly in such areas as health and safety, environment, efficient extraction and use of a non-renewable resource, and interaction with other users of the marine environment.

Industry does not deny the need for regulation. It was clearly recognized in a number of submissions, including those by Exxon/Mobil, PanCanadian, and the Canadian Association of Petroleum Producers.

The efficiency with which this regulation is conducted is one of the key components of the competitiveness of the Nova Scotia industry, and hence directly affects the ability of the province to attract investment to this sector. It is the province's intention to rely primarily on the private sector for development of its energy industries. It is important, therefore, that regulation be set at a level neither higher nor lower than what is required to fully protect the public interest.

The issue of outcomes is important. Regulation is done for a purpose, to achieve an outcome or a "public good." Several industry submissions deemed the proper role of the provincial and federal governments is to determine necessary outcomes from the perspective of the public or resource owners. The primary function of the regulators should be to determine if an outcome is realized, rather than being overly prescriptive as to how it comes about. For example, Exxon/Mobil stated: "Encourage streamlined performance-based processes which maintain public due diligence."

Reliance on an outcomes-based system makes sense. Being overly prescriptive can lead to government regulators micro-managing the industry they are supposed to regulate. In many cases, regulators are not in a position to make such detailed decisions and acquiring the resources necessary to do so is not an efficient use of taxpayers' money.

Establishing Regulatory Processes

While the principle of public interest in energy developments is universally accepted, how each jurisdiction implements the principle varies widely. Unitary states have an advantage in having one level of government responsibility. Nova Scotia faces the challenge of balancing legitimate provincial interests and responsibilities with federal interests and the desire to keep the regulatory system as simple and efficient as possible. Therefore, a significant issue is how to minimize the potential impact of duplication and overlap.

Another area of competitive differences among jurisdictions is the degree to which the regulator is prescriptive about how to achieve the overall goals of occupational health and safety, public safety, and environmental protection. To the extent that such direction is detailed and enshrined in legislation it may inhibit the introduction of new technology or improved work practices. Attempting to comply with or gain permission to work around outdated or outmoded regulations is time consuming and unproductive. A more flexible approach is to specify outcomes and require the business enterprises to develop acceptable solutions.

Finally, there is the issue of government coordination. Even when responsibilities don't overlap, there is potential for confusion and contradictory directions when an industry is regulated with multiple public interests and expected outcomes. In Nova Scotia there is a balance to be achieved in a number of areas, including expectations on the pace of economic development, the need for public interest in areas such as safety and the environment, and the desire for swift decision making against a backdrop of rapidly changing markets, prices, and security issues.

Industry's Identification of Priority Issues

The Canadian Association of Petroleum Producers (CAPP) identified specific regulatory issues of concern. CAPP prepared a matrix of 18 issues that it proposes should be addressed by government. Only two of the issues of direct concern to CAPP are strictly within the province's purview. The remainder require a coordinated approach between the provincial and federal government regulators. As such, the province will pursue a strategy of working more closely with its partners in identifying priority issues and working to resolve them. One of the major items identified is the need to be able to update the legal framework for offshore operations and management as needed.

Current State of Offshore Regulatory Environment

The primary oil and gas legislative authorities for offshore Nova Scotia are the Canada-Nova Scotia Offshore Petroleum Resources Accord Implementation (Nova Scotia) Act and the equivalent federal mirror legislation. The legislation was passed by both levels of government in 1986 following extensive discussions between government and industry. The legislation, in fact, preceded the development of the industry itself. While exploration drilling and seismic activity had been taking place intermittently for more than 20 years, the first offshore development was not constructed until the Cohasset Panuke oil project, which operated from 1993 until 1999.

The drafters of the original accord and legislation attempted to foresee the structure of a new offshore oil and gas industry and put in place the means by which to regulate it. While they did an excellent job in anticipating the industry's development and the required regulatory regime, it is not surprising that the powers incorporated in the acts do not exactly match those necessary to effectively control the offshore industry as it has evolved over the past 20 years. The industry will continue to evolve and so must the legislation controlling it.

It has been cumbersome, if not impossible, for the two levels of government to act together to keep the legislation current. They have been challenged to deal with broad and difficult questions, such as which specific changes are necessary, which legislation should prevail, whether new legislation is required or existing acts can be modified, and the coordination of efforts to prepare the new laws. In addition, Nova Scotia and the federal government are trying to ensure an east coast approach to regulations to minimize differences when energy companies have activities in Nova Scotia and Newfoundland and Labrador. Both levels of government have a responsibility to ensure that mechanisms are in place to allow for reviews and updates to the legislation and regulations governing offshore oil and gas.

Industry and the province have recognized the need for updating. Failure to do so poses significant risks for all stakeholders in the offshore. For example, the original legislation failed to properly outline responsibilities for occupational health and safety. The CNSOPB has developed guidelines that energy companies are required to follow, but the tools for compliance are limited, and new legislation is required.

In other areas the board has the power to exempt a project from following certain out-of-date requirements. But the process of gaining such exemptions is cumbersome and, on a complex project development, may need to be carried out hundreds of times. By forcing regulators to search for alternative means to deal with problems created by out-of-date legislation, these inefficiencies make the Nova Scotia offshore area less competitive.

Because the accord comprises mirror legislation at both the federal and provincial levels, changes require the amendment of both acts. Work to be completed by both levels of government will require a coordinated effort by Natural Resources Canada and the provinces of Nova Scotia and Newfoundland. As demonstrated by recent attempts to revise the regulatory regime applicable to offshore health and safety, it is potentially a difficult and time-consuming process. Following consultation with industry, the governments must reach agreement not only on which changes are necessary, but the revisions must be given sufficient priority to occupy a place on the parliamentary and legislature agendas.

Alternative ways to address the issue run from unilateral action by the province to relying on the existing regulatory framework. While the province is not in a position at this point to specify necessary changes, it does not support the status quo. A comprehensive review of the existing framework is required.

To undertake such a review and subsequent legislative amendments unilaterally is outside the spirit and intent of the joint management framework set up with the federal government. Such a strategy also potentially reopens the debate over offshore jurisdiction, the uncertainty of which could destroy the momentum currently in place. The province therefore supports a strategy of jointly determining the issues and solutions with industry and other levels of government.

The Nova Scotia Approach to Identifying Solutions

The federal and Nova Scotia governments already have in place a body in which joint interests are reflected, the CNSOPB. The board brings the perspective of dealing with the industry and its issues on a daily basis. It has developed considerable expertise on what works and what doesn't in the offshore regulatory environment. It is also in an ideal position to provide a neutral assessment of the issues brought forward. Accordingly, the province supports instructing the board to review the effectiveness of the current regulatory environment and make recommendations to both levels of government on appropriate changes. Such a review should be a positive contribution to the review of issues in the CAPP regulatory matrix.

Governments should also consider whether future reviews are warranted. Such a strategy would be similar to the recent review of the Canadian Environmental Assessment Act. The drafters of the act believed it to be prudent to require a review of its operation. The result of this review is a new piece of legislation proceeding through the federal parliament, which will significantly improve the regulatory processes under the CEAA.

Specific Offshore Regulatory Areas in Need of Action

CNSOPB Authority

The board was established to be the regulator of several key offshore project facility approvals. Over time, the requirements of other agencies, including the NEB, have had an impact on this one-window approach. The province, in the belief that overlap and duplication should be eliminated, will work to ensure that the CNSOPB has the necessary resources to carry out its full responsibilities.

Benefits Reporting

There is an extensive framework in place for reporting on the money spent and people employed during project development and production. The methodology is complex and the public understanding is incomplete. The purpose of such reporting is therefore in question. A growing area of concern for the province is its ability to measure and forecast accurately the impact of the industry on the Nova Scotia economy. Benefits reporting can be important in enhancing this knowledge. A comprehensive review of the purpose and practices for benefits-related information presently submitted will allow for potential streamlining of data collection and an enhanced ability of economists to use the data.

Project Approval Duplications

Energy project developments span the offshore and onshore even though the major focus is on the offshore. Efficient and effective regulations will reflect the proper weight of regulatory interest. For example, the province has signed a memorandum of understanding (MOU) with federal regulators to coordinate the province's role on environmental approvals related to the Deep Panuke project. Reaching common understandings and commitments on project development issues between the province and a project developer will also remove uncertainty and streamline the approval processes. When the province is able to simplify the approval process by adapting the permits of other regulators, it will do so.

In the longer term, the signing of a specific MOU between the provincial Department of Environment and Labour and the Canadian Environmental Assessment Agency (CEAA) will work to minimize the level of overlap in both the onshore and the offshore areas between the two environmental agencies on future projects.

CEAA Process for Exploration

Federal changes to Canadian Environmental Assessment Act (CEAA) approvals could have a significant impact on exploration and development efforts. Transition to CEAA from existing environmental processes is now underway. Exploration activities will now be subject to CEAA. The province will participate fully in the consultations to establish the rules under which the CEAA process will modify the existing environmental regulations. The province will work with the CEAA to ensure that such changesdo not impose unnecessary restrictions on the operators in the offshore area.

Cooperation with Newfoundland

Both Nova Scotia and the province of Newfoundland and Labrador have tremendous offshore oil and gas potential. Both provinces have relatively small populations. If there are significant, multiple new discoveries and projects, the scope of the resulting industry suggests real opportunities for specialization and opportunities to develop world-competitive technologies and services. The rise in exploration activities also opens the prospect of more frequent movement of supply boats and rigs from one province to the other. In addition, potential natural gas projects offshore Newfoundland and Labrador could add to the region's attractiveness for a number of downstream developments.

The two provinces have worked together on regulatory matters, most recently and intensely on the issue of offshore occupational health and safety. Nova Scotia intends to continue a cooperative approach with Newfoundland and Labrador with the goal of implementing energy strategy objectives.

Offshore Occupational Health and Safety

Detailed drafting of new legislation to address occupational health and safety issues in the east coast offshore area is now underway. The required regulations are also being drafted. Public comment is expected to take place in 2002. The length of time between focused government attention on the legal gaps on this issue and the need for amendments to the acts, and the expected resolution of the matter (three years), brings the issue of a more streamlined amendment process to the forefront.

Downstream Regulation

Principles

As a fundamental principle of the energy strategy, the province intends to rely primarily on market forces to establish the supply, demand, and pricing of gas and liquids in markets. This means no subsidies by the government; when the government intervenes to affect market decisions, it will do so on a commercial basis. For example, with respect to natural gas liquids - a key building block for a petrochemical industry - the government requires that they be made available on commercial terms once a demand arises in Nova Scotia.

Local Gas Distribution

Removing Barriers

During the past two years, a number of issues emerged that represent regulatory barriers to achieving local gas distribution (for a complete description of this subject, see backgrounder number 5: Using Nova Scotia Resources). These include issues of potential regulatory duplication and increased cost. For instance, the rules and practices for installing pipe need not vary from one municipality to another. If they were to do so, the cost of distribution would rise. Therefore, the province will work with the Union of Nova Scotia Municipalities, municipalities, and the gas distributor to develop a standard municipal operating agreement.

The province also has an opportunity to reduce duplication and standardize practices among jurisdictions on a number of environmental fronts. Best and standard practices would help reduce the cost of compliance and ensure wider distribution at a lower cost. Therefore, the province will work with local gas distributor(s) to develop a series of standard practices for dealing with issues such as water crossings, sulphide-bearing materials (acidic rock), vegetation clearance and disposal, and protection of archaeological resources.

Improved Process for Underground Storage

The province has identified opportunities for the storage of natural gas onshore. Such storage facilities ensure continuous supply in case of offshore disruptions and are thus an integral party of the system's ability to be a reliable supplier. An act covering the regulatory approval process for such facilities on a simplified and expedited basis has been passed by the Nova Scotia legislature. The province intends to develop regulations to implement the Underground Hydrocarbon Storage Act.

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Part III
Electricity

Seizing the
Opportunity

Volume 2

Nova Scotia's Energy Strategy

NOVA SCOTIA

Part III Electricity

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Electricity

Statement of Principle

Electricity is an essential energy commodity for most individuals, businesses, and industries in Nova Scotia, and therefore must be available in a stable, reliable, and reasonably priced manner.

Nova Scotia's current electrical industry is a regulated monopoly. Future electricity production will be subject to increased regional and continental competition, and higher environmental standards.

Because electricity is so important to individuals and to the industrial and commercial sectors, public policy must take a balanced approach and phase in increased competition over a prudent time frame. Over the longer term, the introduction of increased competition will encourage new market entrants for domestic and export electricity supply. New opportunities to use natural gas and renewable forms of energy will result in a more market-driven industry and improved efficiencies for all customers. These changes will result in a sustainable electricity industry for the province. This scenario is based on private-sector principles that recognize the need for fair rates of return for investors and a consistent, predictable business climate that encourages new investment.

Government Role and Responsibility

Provincial legislation assigns to the Nova Scotia Utility and Review Board (UARB) responsibility for regulating the province's electricity sector. The National Energy Board is responsible for administration of interprovincial and transborder transmission.

Emera Inc.'s wholly owned subsidiary Nova Scotia Power Inc. (NSPI) is a regulated monopoly generating and distributing 97% of the province's electricity. Exports account for approximately 2.5% of NSPI's revenues.

The UARB reviews and approves all NSPI decisions regarding rates, capital spending, and generation; sets the company's capital structure and allowable range of return on equity; and monitors the relationship between the parent company and NSPI. Its mandate as a regulator is to ensure that NSPI fulfills its "obligation to supply" electricity to residents and businesses in a reliable manner and at regulated prices. Other government policy bodies, such as the departments of Natural Resources, and Environment and Labour, have an important role in overseeing NSPI's other social, economic, and environmental responsibilities.

On a broader scale, the provincial government's responsibilities include the availability of electricity at a competitive rate for existing and future economic purposes; ensuring, based on a diversity of fuel sources, that there is security of supply; and monitoring the introduction of technology, environmental improvements, and new electricity sources (such as wind) for provincial industries.

Strategy Objectives

- To maintain continued access to secure, reliable, and affordable electricity produced in an environmentally responsible manner.
- To phase in competition in the Nova Scotia electrical industry.
- To create the regulatory and business environment that will encourage independent producers of wind energy and other renewable sources.
- To develop the policy framework that will encourage cogeneration opportunities, and to introduce competition for the construction of new generation capacity.
- To reduce the environmental impacts of electricity production, and to increase efficiency and demand management.

Actions to Achieve Objectives

2001–2005

- Create an Electricity Marketplace Governance Committee (EMGC), accountable to the Minister of Energy, to facilitate the implementation, development, structure, and rules for introducing electricity competition. The EMGC will represent a wide range of stakeholder groups.
- Work with the Nova Scotia Utility and Review Board (UARB) and NSPI to introduce competition within the electrical sector in a staged and measured process, beginning with supply to wholesale customers (currently six municipal utilities).
- Give policy direction for the UARB to authorize open access transmission on NSPI facilities for all generators selling to wholesale customers or export markets.
- Develop policies to introduce open competition for any new generation capacity approved by the UARB.
- Encourage cogeneration (combined heat and power plants) and permit an independent cogeneration sector in Nova Scotia to have access to NSPI's transmission system.
- Implement new renewable energy policies that allow independent power producers (IPPs) to have open access to NSPI's transmission system and, if the IPP chooses, to market green power directly to retail customers.
- Create a short-term, voluntary, renewable energy target for new IPPs totalling 2.5% of NSPI's generation capacity, or approximately 50 MW. The government and NSPI will monitor the voluntary process for three years and then establish a longer-term renewable energy portfolio standard (RPS) target.
- Implement information programs to promote efficient use of renewable energy technologies.

2006 and Beyond

- Determine the longer-term stages, if any, of increased competition.

- Determine the long-term RPS strategy.
- Continue to improve generation efficiency and reduce overall emissions in the electricity sector.

Links to Energy Strategy Themes

The regulation and operation of Nova Scotia's electricity is an important economic, social, and environmental stewardship responsibility of all parties involved in the industry. The priorities for the industry include ensuring a secure, reliable, environmentally responsible, and reasonably priced supply of electricity; introducing competitive energy markets in a careful and staged manner; and protecting customers through vigilant and fair supervision of the marketplace.

Achieving these priorities will contribute to economic growth and to **Powering the Economy, Improving the Environment**, and **Securing our Future**.

Background

Industry Overview

According to the draft report of the Fall 2001 East-West Transmission Grid Study, Canadians are the third largest per capita users of electricity in the world. A reliable and relatively inexpensive supply of electricity is particularly important to the large electricity-intensive, resource-based industries, such as pulp and paper, oil refining, chemicals, rubber, plastics, textiles, and fish processing, which make significant contributions to Nova Scotia's economy.

Approximately 61% of Canada's electric power is generated from hydro, 18% from coal, 13% from nuclear energy, 4% from natural gas, and 4% from oil and non-hydro renewable energy sources (such as wind, biomass, and solar). This national profile is in stark contrast to the current situation in Nova Scotia, where approximately 77% of the electricity sold by NSPI is generated from coal, 12% from oil, 8% from hydro and tidal, and 3% is purchased from other generators, including imported energy and independent power production. In addition to the electricity sold by NSPI, a number of Nova Scotia operations meet at least a portion of their own electric power needs through self-generation.

NSPI's total generation capacity of 2,187 megawatts (MW) includes 1,238 MW of single-cycle, coal-fired thermal generation (located in Trenton, Pt. Tupper, Lingan, and Pt. Aconi), 332 MW of single-cycle oil/natural gas dual-fired generation at Tufts Cove, 395 MW of hydro and tidal generation, and 222 MW from single-cycle gas turbine plants. NSPI also purchases and sells power from independent generators who collectively own and operate approximately 25 MW of generating capacity.

NSPI's total generating capacity represents only about 2% of the 107,300 MW of total electrical generating capacity across Canada; more than 65,000 MW, or 60% of the nation's electrical generating capacity, is located in Quebec and Ontario.

The coincident peak generating demand on NSPI's system during 2001 was 2,035 MW, or more than 90% of its combined generating capacity limit, while the national system peak was some 87,000 MW, or approximately 80% of Canada's current total generating capacity.

Over the next 20 years, Nova Scotia's projected load growth will require additions of at least 350 MW (16.5%) of new peak generating capacity; nationally, the peak generating load is expected to increase by more than 26,000 MW, or 24.4%. In March 2001, NSPI filed an application with the UARB for approval to add a 47.3 MW single-cycle, natural-gas-fired turbine plant to its generation mix. In addition, the company has recently sought expressions of interest from prospective independent power producers for the development of up to 50 MW of wind-powered generation. NSPI has also committed to building a total of 1.3 MW of wind generation. However, Nova Scotia has virtually no new generation permitted or under construction at this time. Canada's generation capacity is expected to meet its 2020 forecast for electricity demand.

With respect to U.S.-based electricity markets in the northeast region, the Northeast Power Coordinating Council (NPCC) is currently projecting that the combined New England and New York peak summer demands will increase by 28%, from 54,000 MW in 2001 to more than 69,000 MW in 2020. Sufficient merchant generation is expected to be constructed to meet this growing demand. However, NPCC's 2000 Self-Assessment indicates that if transmission constraints in the New England area are not resolved over the next five to ten years, the region could face serious reliability concerns due to the inability to fully integrate new merchant generation facilities throughout the entire NPCC region.

NSPI is a regulated cost-of-service, vertically integrated, monopoly electric utility. Historically, the utility and the regulator have linked the economic justification for new generation with the need for new transmission capacity. Electricity restructuring recently undertaken in Alberta and Ontario, and in a number of U.S. states, has decoupled the responsibilities for planning and developing generation from transmission. Under these restructured electricity markets, only investments in new transmission infrastructure must be approved. Maintaining an adequate transmission infrastructure is considered vital to the development of robust, competitive, market-based generators.

The existing Canadian transmission grid extends over approximately 158,000 km and comprises 37 major interconnections with a total interprovincial transfer capability of over 10,000 MW. NSPI currently owns and operates 5,250 km of transmission lines (69 kV and up) in Nova Scotia. Its system is interconnected with New Brunswick Power's system in a 300 MW firm-capacity tie.

The direction of electricity flow is usually dictated by the price differentials between neighbouring jurisdictions. Typically, interprovincial electricity trade originates from provinces that produce large supplies of relatively low-cost hydro-based electricity. These interprovincial electricity flows are largest in eastern Canada, where the flow from Labrador to Quebec accounts for 70% of the total. Ontario has traditionally imported a portion of its electricity supplies from Quebec and Manitoba. In recent times Alberta, to satisfy rapidly rising demand, has been steadily increasing its electricity purchases from British Columbia.

A number of Canadian utilities also enjoy access to lucrative U.S. markets through various north-south electricity interconnections. Net Canadian electricity exports to the United States in 2000 exceeded 36,000 GWh. However, Canada's net exports to the United States have decreased significantly in recent years due to an increase in U.S. electricity exports to Canada. Current net exporters of electricity to the United States include New Brunswick, Quebec, Ontario, Manitoba, and British Columbia, while Alberta and Saskatchewan are net electricity importers.

Nova Scotia, like Prince Edward Island and Newfoundland and Labrador, does not currently have direct access to potentially lucrative export markets in the United States. However, the U.S. Federal Energy Regulatory Commission (FERC) has moved to force more open transmission access in the U.S. market, first through its Orders 888 and 889, and more recently in Order 2000. FERC has not yet established rules for Canadian utilities under Order 2000. If Canadian utilities choose to join a Northeast Regional Transmission Organization (RTO), suppliers from these provinces will likely have open, non-discriminatory, and market-based access to these export markets through the transmission systems of U.S. and Canadian utilities in the RTO. In the case of Nova Scotia, enhancements to interprovincial and international transmission grids are required to facilitate any significant increase in electricity trade.

Nova Scotia Electricity Industry Profile

History

Nova Scotia's electrical generation evolved from providing local service, to regional power distribution, to providing a common service available throughout the whole province. By the mid 1960s, the privately owned Nova Scotia Light and Power was the dominant utility in the province. As a matter of government policy in the 1970s, most of the private utilities were consolidated into one entity, the Crown-owned Nova Scotia Power Corporation. This consolidation was designed to encourage the development of a transmission grid and enable the financing and construction of large coal-fired generation plants in Pictou County and Cape Breton. In 1992 the government decided that electrical generation, transmission, and distribution could be better managed in the private sector. It sold its shares of Nova Scotia Power to investors.

Economic Importance

Nova Scotia Power Inc. (NSPI), through its parent company, Emera Inc., is one of Nova Scotia's largest publicly traded corporations. The following consolidated financial information was released in December 31, 2000:

- revenues: $896.5 million; net earnings: $104.4 million; assets: $2,951.0 million;
- 1785 employees; 440,000 customers;
- municipal grants paid in lieu of taxes: $11.0 million; provincial capital taxes paid: $7.2 million;
- net capital expenditures for 2000: $121.4 million.

NSPI is the predominant electricity supplier in Nova Scotia, owning and operating 97% of the generation, 99% of the transmission, and 95% of the distribution systems in the province. The remaining distribution is owned and operated by six municipal utilities: Canso, Antigonish, Berwick, Riverport, Mahone Bay, and Lunenburg.

Unique Properties of Electricity

Electricity is a real-time commodity that must be produced and delivered on demand; it is not feasible to store it in significant quantity without major pumped-storage hydro facilities. Nova Scotia electricity providers must, therefore, ensure adequate generation, transmission, and distribution to service peak-power demands, resulting in under utilization during non-peak periods. NSPI is required to maintain a generation reserve margin of at least 20%, which includes the utility's interruptible load of 16%.

Electricity Sector Facilities in other Provinces

Nova Scotia is one of only four provinces in Canada that produces the majority (87% in the case of Nova Scotia) of its electricity from carbon-based fossil fuels (coal, oil, natural gas); the others are Alberta (91%), Saskatchewan (66%), and New Brunswick (64%).

British Columbia, Manitoba, Quebec, and Newfoundland generate electricity mainly by large-scale hydroelectric systems. Ontario relies on a mix of hydroelectric, nuclear, and coal- and oil-fired thermal generation. Legislation in Nova Scotia forbids the use of nuclear-powered electricity generation facilities in the province.

Environmental Issues

Over the next several decades, electricity production in Nova Scotia will face growing pressure from environmental regulation and control. Canada has signed, but not ratified, the Kyoto Protocol, which is aimed at reducing carbon dioxide and other greenhouse gas emissions implicated in causing global climate change. To meet its targets, if ratified, the protocol will require large reductions in the worldwide use of fossil fuels.

Reductions in the use of high-carbon fuels such as coal and oil will come from switching to lower-carbon fuels such as natural gas, substitution with hydroelectricity, or the use of renewable energy sources such as biomass, wind, and solar energy. Cleaner coal-burning technologies and, in the longer-term, new technologies such as fuel cells, are also expected to play a part in reducing emissions.

In addition to climate change considerations, other environmental air quality concerns, such as sulphur dioxide, mercury, nitrogen oxides, and particulates, play an important role in future electricity generation. Reductions in the emissions of these pollutants to protect human health and our environment will have a significant impact on fuel choice in the decades ahead. As a result, costs for switching fuels or implementing new technologies may well put upward pressure on electricity prices to consumers.

Regulatory Framework in Nova Scotia

The UARB-approved rate structure is designed to allow NSPI some flexibility in achieving results, while ensuring that the company does not earn an excessive rate of return on its equity. Long-term bondholders are guaranteed a return on their investment and the return of original principal by NSPI. The allowable range for the rate of return on equity for shareholders in 2001 is currently 10.5% to 11%.

The province will participate in UARB rate and facilities hearings in order to clearly understand the issues and help complete the public record before the Board.

Electricity Restructuring in other Marketplaces

Restructuring of the electric utility industry has received much attention in recent years, especially because of consumer benefits derived from the deregulation of the telephone industry. The advent of highly efficient and relatively inexpensive (from a capital-cost standpoint) natural-gas-fired electricity generation systems has led to consumer and business demands for competition in the electricity sector. A growing number of jurisdictions share the view that electricity prices should be determined primarily by the market rather than by regulation, and that competition should lead to improved efficiencies and increased consumer choice.

In the United States, the federal government introduced the Energy Policy Act of 1992 and a series of FERC orders to force utilities to allow open and equal access to their transmission systems. Open transmission access creates conditions that allow competition in wholesale electricity markets. To date, the District of Columbia and 25 states have adopted restructuring legislation or regulatory orders, and almost all other states are contemplating restructuring at some level. However, the recent failure of the regulatory changes in California has caused many jurisdictions to take a second look at their plans for retail electrical competition.

In Canada, the provinces have jurisdiction over intraprovincial transmission networks, while the National Energy Board has jurisdiction over issues related to electricity exports and international and designated interprovincial power lines.

Ontario and Alberta have taken the lead in moving forward with electricity restructuring to allow retail competition. Both are expected to implement the next phases of market reforms during 2001 and 2002. However, since Alberta introduced retail competition to its marketplace on January 1, 2001, energy price volatility has forced the introduction of rate subsidies to protect consumers from much of the increase in the cost of electricity during the first six to nine months of the year.

In its Energy Policy white paper of January 2001, New Brunswick announced its plan to restructure its electricity market by April 2003 to facilitate wholesale and retail competition for its large industrial customers. A market design committee, which will report to government by April 2002, is addressing these developments.

British Columbia, Alberta, Saskatchewan, Manitoba, Ontario, and Quebec have taken steps to satisfy the requirements of the FERC orders, which are intended to provide open access to their transmission facilities to any entity that desires to service their domestic wholesale customers.

Globally, a number of countries have introduced market reforms to their respective electricity markets, including the European Union countries, Australia, New Zealand, much of South America, and a number of Asian countries. Argentina and the State of Victoria in Australia have also been cited as two jurisdictions where restructuring has been successful.

NSPI since Privatization

Since privatization in 1992, NSPI has continuously reduced inefficiencies to become more competitive. NSPI expects that in the longer term it may be required to compete with natural gas and other electricity service providers in the bulk-power system of the northeastern region of North America. These efforts to remain competitive explain partly why NSPI has applied for only one minor rate increase, which occurred in 1996, since it became a private company.

During this period, electricity rates have been stable, as cost increases have either been mostly offset by operating efficiency, or additional profits such as the recent export sales of natural gas. This period of stability may be changing as NSPI is currently under pressure from higher fuel costs, particularly world coal prices and the declining Canadian dollar, which further increase the costs of imported products such as coal. Other pressures in the near to medium term are NSPI's expected increases in corporate income tax , both federal and provincial. The low tax position of the company ends when it has used up most of its tax deferral allowances on its fixed assets. By 2003-04, NSPI expects to be fully taxable. NSPI also has an outstanding tax dispute with the Canada Customs and Revenue Agency which could significantly impact electricity rates if it is not settled in the utility's favour.

In recent years, NSPI has introduced new rate options: a time-of-day rate option for residential customers and real-time pricing options for its larger customers. Encouraging consumers to shift a significant portion of their electricity use to off-peak times results in a more efficient use of the utility's existing system and delays the requirement for additional capacity.

Because of these initiatives, NSPI's rates for its largest Nova Scotia customers are among the lowest available in the northeastern market. Residential customers who take service under the new time-of-day rate option also enjoy one of the lowest residential rates in the northeastern region.

In addition to providing competitively priced power, NSPI has exhibited a solid record of system reliability. System outages have been maintained well within industry standards.

Overview of Wind-Generated Electricity

Renewable energy already plays a significant role in Nova Scotia's energy mix. The province currently has the capacity to generate 420 MW of electricity from renewable sources, including biomass, hydro, and tidal power. In 2000, NSPI produced about 8% of its electricity from hydro.

Historically, renewable energy projects, with the exception of large hydro projects, have found it difficult to compete with fossil-fuel generation because of higher capital costs. However, continuing improvements in technology, particularly in the field of wind and solar generation, are rapidly closing the price gap.

Wind energy is, in most situations, the most cost-effective renewable source for large-scale electricity generation. Installed worldwide capacity is increasing rapidly, growing 28% during 2000 to 17,300 MW. Rapid expansion of wind generation capacity is expected to continue for the foreseeable future as turbine sizes and efficiencies increase and costs continue to decrease.

As a result of government initiatives and strategic investment over the past 25 years, Denmark has captured about half the world wind-turbine market, a market worth $1.5 billion dollars in 1999. Wind supplies about 12% of Denmark's electricity. Other countries with rapidly expanding wind generation capacity include Germany, the United States, Spain, Italy, the Netherlands, and India.

The total current operating wind turbine capacity in Canada is about 142 MW. Canada's largest wind project is Quebec Hydro's 102 MW "Le Nordais," located on the Gaspe shore. Most of the remaining capacity is in Alberta. A wind energy facility in Saskatchewan is currently undergoing final commissioning and will generate electricity for 25% of the federal government consumption at a premium price for ten years. A second system is planed to generate part of the provincial government consumption.

Public Advice

The consensus of stakeholders was that the province should adopt a very gradual and controlled transition in any restructuring of the Nova Scotia electricity market. This is prudent advice given the experiences to date in many jurisdictions, where the implementation of significant restructuring over a relatively short time interval has given rise to unintended consequences, including significant price increases, volatility, unreliable power supplies, and in the case of California a number of bankrupted utilities.

Analysis

Context

As occurred in the U.S. natural-gas industry 10–15 years ago, the electricity industry is in a period of restructuring, moving in the direction of non-vertically integrated utilities, competitive markets, and a much higher degree of geographic integration of the electricity markets. The rules for these markets are also evolving at a rapid pace, but in some cases they have not been consistent with the requirements for making sound investment decisions.

The U.S. electricity sector has changed rapidly in the past five years, moving toward more competition at both wholesale and retail levels. Canada's electricity sector began its transition to open competition and restructuring with Alberta in 1996, and Ontario is a couple of years into its restructuring. The results to date have been mixed, with huge failures and volatility in California and Alberta overshadowing small but positive results in Pennsylvania, New York, Maine, and other locations. Other countries around the world have restructured or are restructuring, with similar mixed results. Many jurisdictions are undertaking a review of their restructuring plans before proceeding.

Current Electricity Industry Issues

In its submission to the energy strategy task force, the Canadian Competition Bureau "recommends that Nova Scotia adopt an evolutionary, cautious approach toward restructuring." It goes on to suggest that restructuring to facilitate competition in Nova Scotia's electricity marketplace will enable the following benefits:

- more efficient use of existing generation assets;
- rapid adaptation of the electric industry to the availability of new technology (specifically, gas-related technologies);
- more efficient investment in new capacity;
- more appropriate price signals for consumers, such as making real-time pricing options available for all customer classes;
- more innovative customer supply options and choices; and
- a transfer of risk from ratepayers to investors.

Nova Scotia would be exposed to several potential risks if it were to restructure in an inappropriate manner:

- higher costs, particularly in the near term, arising from restructuring costs;
- erosion of reliability of electricity service; and
- convergence of market-based prices with higher-priced neighbouring jurisdictions, thereby impacting Nova Scotia's competitive advantage.

In establishing the market conditions required to facilitate a fully competitive electricity market, experiences from other jurisdictions around the globe have shown that unintended consequences can be minimized, if not avoided, by restructuring electricity markets in a gradual and controlled manner.

NSPI's submission to the task force also encouraged "gradually opening Nova Scotia's electricity markets to competition," while protecting the province's competitive advantage. It also stated that a greater percentage of its future energy requirements would come from green power, and it indicated that environmental considerations must be an integral part of the province's new energy strategy.

The province accepts the advice of stakeholders such as NSPI, electricity customers, and its own advisors, and will proceed with a controlled, long-term approach to electricity restructuring.

Implementation Considerations

It is important that industry and regulatory frameworks evolve at provincial, regional, national, and international levels, and that Nova Scotia work with other provinces (such as New Brunswick) and the United States (especially New England). Provincial transmission systems need to be improved in order to expand the capacity for exports, legislate initiatives to improve the environment, and facilitate more efficient regulation.

In the United States, FERC Order 2000 sought to establish voluntary participation in regional transmission organizations (RTOs) covering large geographic regions of the country. To date, however, FERC's voluntary approach has not been a success and it has, therefore, recently been developing steps to require all utilities to establish or join an RTO, or lose their rights to sell power in U.S.-based markets at market rates.

FERC's goal is to have a seamless national power marketplace. FERC requires qualifying RTOs to demonstrate four market characteristics:

- independence from market operators,
- appropriate scope and regional configuration,
- operational authority over all transmission facilities under its control, and
- exclusive authority to maintain short-term reliability.

Several Canadian utilities, including NSPI, are considering membership in an RTO. Nova Scotia's electricity load growth is projected to increase from a peak of 2,035 MW in 2001 to 2,400 MW in 2020. Most of Nova Scotia's future capacity additions are projected to come from natural-gas-based generation, with a small share from wind energy. To increase its export volumes, Nova Scotia will have to expand its transmission system in the near term beyond the 300 MW interprovincial tie it currently has with New Brunswick. An alternative that has been proposed is a major export project involving new gas-fired generation of 1,200 MW, together with new subsea transmission to New England. For Nova Scotia's electricity exports to grow significantly, our industry will have to conform to FERC rules.

In the longer term the opportunities for growth in interprovincial electricity trade and international exports are related to the need to reduce atmospheric emissions, especially greenhouse gas (GHG) emissions. For Canada to reach its targeted reduction in GHG emissions as part of the climate change accord known as the Kyoto Protocol, it will have to produce and use more electricity generated from hydro, natural gas, and renewable energy sources such as wind. A risk for Nova Scotia is a forced and premature reduction in coal-generated electricity, which is a large contributor to GHG and other air contaminants. Depending on the timing of any such actions, and how the federal government manages the sharing of any resultant costs across all jurisidictions, this could result in expensive stranded assets, a more rapid switch to other fuel sources, and significantly increased electricity prices.

Development and commercialization of new technologies have great potential for impact on electricity markets in Nova Scotia and elsewhere. A trend toward smaller "distributed" generation units, built closer to load centres and using a variety of fuel sources, is having a profound impact on the structure of the industry. In the next decade or so, the majority of new generation units will involve natural gas that is readily available at or near load sites. Renewable energy sources such as wind are also distributed, usually in rural areas. As technology improves, fuel-cell generators will become widely used in the longer term by those seeking uninterruptible power supplies. The added environmental advantage is that many such technologies will not emit greenhouse gases.

Increased competition, shifts in fuel supply and choices, higher environmental standards, and pricing dynamics have changed the nature of the electricity sector. Historically stable electricity prices have given way to market-price volatility caused by fuel supply uncertainty, transmission grid constraints, spot market pricing, and general unreliability of the system. This is causing some customers to change their behaviour and operating practices, such as:

- switching to "real-time" pricing and reducing loads,
- seeking cogeneration alternatives,
- encouraging more competition among generators, and
- supporting increased R&D in energy technologies, including clean-coal technology, in the recognition that coal will continue to be the primary and most cost-effective fuel source for many decades to come.

Nova Scotia Electricity Restructuring Plan

Electricity Marketplace Governance Committee

Restructuring the Nova Scotia electricity industry and increasing competition will require a number of choices on a wide range of issues. How these issues are resolved will have a profound impact on the electricity market in the medium and long terms.

To oversee the implementation of these choices, government will create a multi-stakeholder Nova Scotia Electricity Marketplace Governance Committee (EMGC). The EMGC will report to the Minister of Energy and will be given a mandate with a clear time limitation. It will also have access to advice and expertise to enable the assessment and resolution of the many complex issues involved in carefully and professionally guiding the evolution of Nova Scotia's electricity industry. The committee will operate within terms of reference and an atmosphere of openness, and it will seek input from a wide number of stakeholders. It will make interim reports and a final report to the Minister of Energy.

An example of a mandate for EMGC could be as follows: "Recommend to the minister a market development plan, including structure, economic considerations, and rules, for the implementation of the Nova Scotia electricity market as outlined in the energy strategy."

Broad categories of issues the committee will assess and make recommendations on could include:

- issues relating to the competitiveness of the Nova Scotia market;
- issues relating to transmission, including tariffs and open access;
- issues relating to cogeneration, including definitions, size, and rules that will encourage additional cogeneration;
- issues relating to the future of the Nova Scotia system, including compatibility with interconnected systems;
- issues relating to the potential risk for stranding of NSPI assets;
- defining "heritage" electricity assets in Nova Scotia to ensure protection of the province's competitive advantage in electricity prices;
- terms of an independent power producer (IPP) voluntary green-power marketing program, to be followed by the determination of a longer-term renewable energy portfolio standard (RPS) for renewables; and
- defining "renewables" for policy purposes.

Introducing Wholesale Competition to Municipal Utilities

To date, the size and profitability of NSPI's export market has been severely limited by a 300 MW interconnection with New Brunswick, a relatively high transmission tariff in New Brunswick, limited surplus generating capacity (particularly during the winter months), and the fact that Nova Scotia does not currently satisfy FERC's reciprocity requirements (FERC Orders 888 and 889). Nova Scotia is currently restricted from making sales directly to U.S.-based customers and, as a result of both geography and FERC policy, is forced to sell to New Brunswick Power. Currently, New Brunswick Power also cannot make sales directly to customers in the United States and must rely on third parties. This practice obviously reduces the profitability of NSPI's export sales.

By the phased restructuring of Nova Scotia's electricity market, initially to facilitate wholesale competition, NSPI risks only the loss of its six municipal customers to competitive generators. Current sales to these six municipal utilities represent only 1.6% of NSPI's current electricity sales. In exchange for risking the loss of these customers to competing entities, Nova Scotia–based generators may be afforded an opportunity to increase significantly the quantity and profitability of electricity exports, particularly during the summer months, when most utilities in the northeast region experience a peak air conditioning–based load.

The proposed phased restructuring will create wholesale competition while maintaining a regulated cost-of-service utility with an obligation to serve Nova Scotia customers.

Open Access to Transmission and Unbundling

To meet FERC's reciprocity requirements for non-discriminatory, open transmission access, NSPI will be required to separate accounting for its generation, transmission, and distribution divisions, including ancillary services. The economic advantage of retaining the economy of scale of a relatively small, vertically integrated utility like NSPI is considered to be very important for Nova Scotia's residential and business sectors. The separation of key utility functions will be accounted for on customers' bills without the forced divestiture of part of the utility's physical assets, as has been required in other jurisdictions.

The transmission and distribution of electricity, with the exception of the six municipalities, will continue to be a monopoly function owned and operated by NSPI.

Competition for New Generation Capacity

As a regulated cost-of-service utility with an obligation to serve all Nova Scotians, NSPI currently has the sole responsibility for maintaining adequate supplies of electricity in the province. As a consequence of this regulatory obligation, NSPI has historically been the only provider of new generation capacity, which, when approved by the UARB, are added to NSPI's cost-of-service rate base. Ratepayers, therefore, assume the cost of paying off these capital projects, plus a regulated rate of return.

In the future, once the UARB determines the need for additional "firm" generating capacity, it will issue a request for proposals from qualified bidders (in addition to NSPI, which must bid because of its obligation to service) to provide the defined quantity of additional firm power capacity. Under this process NSPI will face competition from other, potentially more cost-efficient prospective electricity providers. Successful bidders other than NSPI will negotiate a power purchase agreement (PPA) to deliver to NSPI's system. In this case the successful entity would become an electricity wholesaler to NSPI; it could also sell a portion of any new generation capacity to the municipal utilities and export extra capacity. If NSPI is the successful bidder, the costs will be taken into the rate base as is currently the regulatory practice.

Historically, in seeking approval from the UARB, NSPI has linked the economic justification for new generation with the resultant need for new transmission capacity. Electricity restructuring in many jurisdictions has decoupled the responsibilities for planning and developing generation from transmission. In these restructured electricity markets only investments in new transmission infrastructure must be approved. Maintaining an adequate transmission infrastructure is vital to a growing generation system and the development of robust, competitive, market-based generators. Assessment of competing bids for any new generation will take into account associated requirements or operating implications for the transmission system.

Encouraging Cogeneration

The province will encourage the development of cogeneration (combined heat and power plants) by requesting the UARB to permit independent cogenerators sited in Nova Scotia to have open access to NSPI's transmission system in order to wheel power over that system for purchase by NSPI, the municipal utilities, or for export sales. In the long term, it is estimated that existing Nova Scotia industries could install between 100 and 200 MW of new cogeneration capacity.

Combined heat and power plants offer significant improvements in energy efficiency (i.e. the percentage of fuel input energy that is output as usable electrical and thermal energy). Energy conversions up to 90% may be attainable in cogeneration facilities as compared with conventional single-cycle fossil-fuel generation plants that typically convert only 35% of the energy consumed into electricity output. Environmental impact is also significantly reduced. These benefits of cogeneration are even more applicable in gas-fired generation, which is less expensive to convert, simpler to operate, and more efficient. Coupled with the fact that this technology is now readily available as a relatively low-cost distributed-energy system, gas-fired generation may in the future offer Nova Scotia the lowest-cost option for smaller, incremental, new generation capacity. Distributed systems also have the added benefit of reduced transmission losses.

Opportunities exist to employ combined heat and power systems cost effectively in large industries (pulp and paper, oil refining, etc.), hospitals, and district energy systems.

Renewable Electricity

It is a desirable objective for environmental and rural economic development purposes to encourage the growth of a renewable power industry in Nova Scotia.

Renewable energy sources offer a sustainable supply of energy that is in one way or another derived principally from the energy released by the sun, or, in the case of tidal energy, the gravitational force of the moon. Renewable energy sources that can be used to generate electricity include wind, biomass (wood and agricultural crops or waste), solar-photovoltaic, "run of the river" micro-hydro, and tidal.

The UARB will be asked to approve a number of renewable energy policies. It is proposed that independent power producers (IPPs) employing renewable energy generators sited in Nova Scotia be given open access to the NSPI transmission system to wheel "green" power directly to customers if they so choose, or to sell to NSPI for a price that is at least equivalent to NSPI's average system cost, subject to system balancing, connection, economics, and ancillary costs.

The province and NSPI will create a short-term voluntary renewable target for new IPP generation totalling 2.5% of NSPI's current generation capacity. The province and NSPI will monitor the voluntary target for three years and then establish a longer-term Renewable Portfolio Standard (RPS). Green power purchases will initially be voluntary. To achieve higher volumes of green-power production, it is anticipated that a premium price will have to be charged at some point. This small green-power premium would be rolled into NSPI's regulated cost-of-service base and be applied to the electricity rates of all Nova Scotia electricity consumers. Current estimates indicate such an increase would likely occur in years three to five and be less than one-half of one percent.

Nova Scotia Power's Green Power Initiative

During the summer of 2001, NSPI launched its Green Power Initiative, whereby it sought expressions of interest for the construction of 50 MW of wind-energy generation. It received about 20 submissions from local, national, and international parties and will complete its analysis of this project by the end of 2001. NSPI also announced that it was committed to the construction of 1.3 MW of wind-powered generation itself. The Government of Canada is expected to participate in NSPI's green-power program for 70% of the electricity it uses in Nova Scotia. The province will participate in a green-energy program at premium pricing for at least 20% of the electricity used in its public buildings. The IPP renewable-energy target will total approximately 50 MW and is in addition to NSPI's recently introduced green-power program.

Net Metering for Micro-Generators

NSPI is actively working with electrical and electronic manufacturers to develop safe, reliable, and low-cost equipment that will allow people such as farmers to interconnect micro-generation units (typically less than 50 kW) with NSPI's system. Net metering enables individual customers or small rural businesses such as farms, to offset their requirement for purchased electricity by installing micro-generators, typically employing wind, solar, or mini-hydro power systems. Being interconnected with the grid means that there is always a demand for the power as it is being produced (thereby eliminating the need for costly power storage). As implied by the term "net-metering," customers partially offset the cost of their purchased energy by the quantity of energy they bank with NSPI from using their micro-generators.

UARB Issues

Proceeding in an efficient manner with the proposed restructuring requires attention to certain resource, budget, and training issues. There will be an increase in workload placed on UARB staff to deal with a number of issues that will need immediate and, in some cases ongoing, attention. They include:

- unbundling, from an accounting and administrative standpoint, NSPI's various cost centers (generation, transmission, distribution, administrative functions);
- establishing an open-access transmission tariff and ensuring that the transmission operator dispatches the system in a non-discriminatory manner;
- establishing green-power rates and ensuring that they are fairly passed through NSPI's billing system to the green-power producers;
- establishing the need for additional generation and transmission capacity and ensuring that the competitive bid process for new capacity additions is fair and open;
- establishing the rules and procedures for self-generators to take advantage of economic cogeneration opportunities; and
- addressing the regulatory and administrative tasks required for the UARB to be responsive to the competitiveness standards of the energy industry.

Electricity Exports

Access to the electricity export markets of New England and the northeast United States, using the existing transmission system, is inextricably linked to the fact that New Brunswick stands between Nova Scotia and those potential U.S. customers. The same is true for Nova Scotia's potential exports to other Canadian provinces.

The future direction of electricity markets in the United States is increasingly tied to FERC's strategy for fostering competitive markets and securing a reliable, high-quality, and environmentally responsible transmission infrastructure. It aims to achieve this objective by forcing fundamental changes to the organization and operations of the transmission system. The FERC rules have wide implications for all Canadian electrical utilities that want to export to the United States. While Nova Scotia is a small exporter transacting its sales through New Brunswick Power, FERC does have important current and future implications for NSPI and future IPP and cogenerators' business prospects. In the medium to longer term, NSPI may have to join an international RTO if it wants to sell electricity directly to U.S. customers. An important prerequisite to such sales is the planned creation of an open-access transmission system and the opening of wholesale markets for sale of electricity to Nova Scotia municipal utilities.

Opportunities for electricity exports from Nova Scotia are limited in the near term by both transmission system constraints and economics. This situation may change in the next five to ten years if large quantities of offshore natural gas are discovered, and become economically available for new gas-based electricity production. Such conditions could then trigger the financial conditions needed either to expand significantly the current transmission system in Nova Scotia and New Brunswick, with links to New England and possibly Quebec, or to justify a new transmission system to the United States either completely overland or with a combination of transmission overland and undersea.

In exploring export opportunities, one option being considered to comply with FERC reciprocity rules is the formation of an international RTO led by New Brunswick Power and including P.E.I.'s Maritime Electric Utility, NSPI, and one or more New England utilities. Currently known as ECTO (East Coast Transmission Organization), this proposed organization would be similar to U.S.-based RTOs, except that the utilities would not turn over their respective transmission assets to an independent transmission operator.

An important objective for any restructuring of Nova Scotia's electricity industry (or for its main utility joining an RTO), is the protection of the current electricity price advantage experienced by consumers and businesses. The proposed Electricity Marketplace Governance Committee will define Nova Scotia's "heritage" electricity assets to ensure protection of our competitive advantage in electricity rates.

Nova Scotia will work with New Brunswick to encourage the maximizing of opportunities for electricity exports, expansion of transmission capacity, development and implementation of security issues, and introduction of new technologies to promote the long-term growth of both provinces' electricity industries.

Other Electricity Actions

The main actions to reduce the environmental impacts caused by electricity generation, primarily from coal in Nova Scotia, are outlined in the Environment background papers (11 and 12) of this report and deal with air emissions and climate change. Other ways to optimize existing generation plants and reduce emissions include developing a targeted demand-side management (DSM) program and/or introducing a system-benefits charge (SBC) plan. Both of these are designed to encourage consumers to reduce their consumption of electricity, shift usage to off-peak hours, and introduce more efficient technologies and equipment to process electricity in their various applications. Government will encourage NSPI and UARB to develop creative DSM and SBC programs to improve electricity efficiency and reduce overall consumption. Wiser and more efficient energy consumption results in displacing new generation capacity and lowers costs to all customers, while improving the environment.

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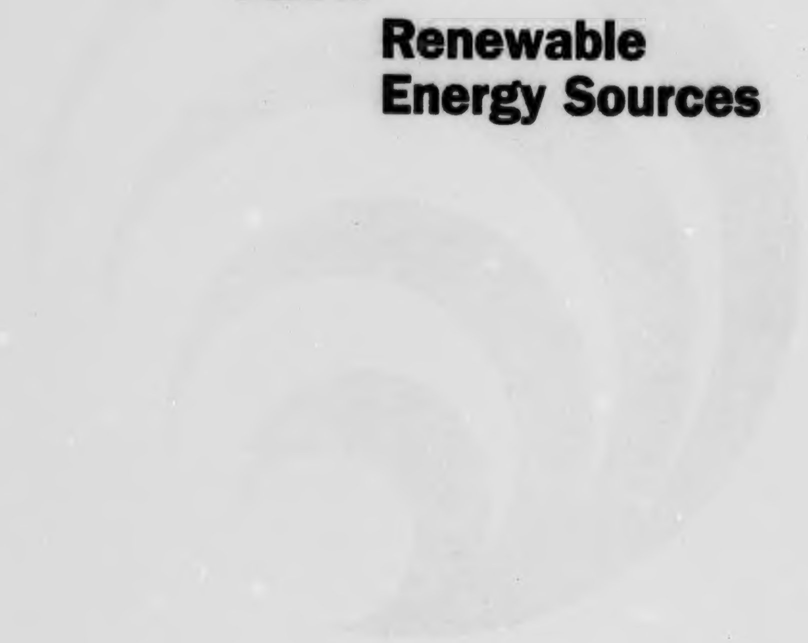
Part IV

Renewable Energy Sources



Seizing the Opportunity

Volume 2

Nova Scotia's Energy Strategy

NOVA SCOTIA

Part IV Renewable Energy Sources

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Renewable Energy Sources

Statement of Principle

Renewable energy sources will play an increasingly important role in electricity generation in Nova Scotia. Increased use of renewable energy will provide new business opportunities, increase the efficiency of the electricity system, and contribute to Nova Scotia's commitment to a sustainable energy future.

Renewable energy sources - broadly defined to include wind, solar, geothermal, biomass, mini-hydro, tidal, and hydrogen fuel cells - can provide a virtually inexhaustible source of energy with relatively little environmental impact.

The government will create a regulatory environment that will encourage and promote the development of a renewable energy industry in Nova Scotia. A "green-power" purchase program will enable all electricity consumers to participate. The government will support programs to educate the public about the benefits and efficient use of renewable energy sources.

Government Role and Responsibility

The provincial government is responsible for the policy framework within which renewable energy is managed. The Department of Natural Resources (DNR) provides a variety of programs and information services aimed at educating the public and promoting the use of renewable energy. The rights to explore for and develop geothermal energy are issued by DNR under the Mineral Resources Act. The Department of Environment and Labour is responsible for carrying out environmental assessments of renewable energy installations and for regulating their environmental performance under the Environment Act.

Regulation of electricity generated from renewable energy sources, including setting of rules and rates for purchase and transmission access, is the responsibility of the Nova Scotia Utilities and Review Board (UARB).

Strategy Objectives

- To encourage the growth of a renewable energy industry in Nova Scotia.
- To increase renewable energy-based generation capacity and ensure open and fair access to the NSPI transmission system.
- To increase public awareness concerning the opportunities and benefits of using renewable energy sources.

Actions to Achieve Objectives

2001-2005

- Create an Electricity Marketplace Governance Committee (EMGC), accountable to the Energy

Minister, to facilitate the implementation, development, structure and rules for introducing electricity competition. The EMCG will represent a wide range of stakeholder groups.

- Give policy direction for the UARB to authorize open access transmission on NSPI facilities for all generators selling to wholesale customers or into export markets.
- Implement new renewable energy policies that allow Nova Scotia-based independent power producers (IPP) to have open access to NSPI's transmission system, and if the IPP chooses, to market green power directly to retail customers.
- Create a short-term voluntary renewable energy target for new IPP's totalling 2.5% of NSPI's generation capacity, or approximately 50 MW. The government and NSPI will monitor the voluntary process for three years and then establish a longer-term renewable portfolio standard (RPS) target.
- Establish (through the UARB and NSPI) a green-power purchase rate structure for all NSPI rate classes. This rate will apply to sales by NSPI but not necessarily for IPP sales direct to customers.
- Participate in a green energy program, at premium pricing, for a percentage of the electricity used in provincial public buildings.
- Encourage municipalities and public sector agencies to set their own green power purchase targets for the voluntary period.
- Formalize NSPI's current policy of allowing net metering for renewable energy systems. Establish through the UARB a specific category under NSPI's rates and regulations. The maximum capacity for systems to be eligible to participate will be recommended by the EMGC.
- Review the legislation under which rights to develop geothermal energy are presently issued to determine whether these can be dealt with more efficiently.
- Adopt standards that require all new wood burning appliances sold in Nova Scotia to meet minimum efficiency standards and Wood Energy Technical Training (WETT) installation certification.
- Implement information programs to promote efficient use of renewable energy technologies.

Links to Energy Strategy Themes

Renewable energy will contribute to **Powering our Economy** when independent power producers develop a new industry around this source of electricity, creating jobs and economic activity in the province directly though construction of wind farms, and indirectly through manufacturing renewable energy technology and other services that the industry will require.

Renewable energy can make a significant contribution to **Improving our Environment** by displacing fossil fuel generated electricity and avoiding the environmental impacts of the associated air pollutants and greenhouse gas emissions.

Nova Scotians will contribute to **Securing our Future** by reducing dependence on petroleum-based energy sources.

Background

Renewable energy sources provide an almost inexhaustible supply of energy that is renewed by natural processes. Renewable energy already plays a significant role in Nova Scotia's energy mix. The province currently has the capacity to generate 420 megawatts (MW) of electricity from renewable sources, including biomass, hydro and tidal power. In 2000, NSPI produced about 8% of its electricity from hydro.

Historically, renewable energy projects have found it difficult to compete with fossil fuel generation because of higher capital costs. However, continuing improvements in technology, particularly in the area of wind and solar generation, are rapidly closing the price gap and this is resulting in a dramatic increase in the amount of installed capacity on a global basis.

Overview of Wind-Generated Electricity

Wind energy is, in most situations, the most cost-effective renewable source for large-scale electricity generation. Installed worldwide capacity is increasing rapidly, growing by 28% to 17,300 MW during 2000. Rapid expansion of wind generation capacity is expected to continue for the foreseeable future as turbine sizes and efficiency increase and costs continue to decrease.

As a result of government initiatives and strategic investment over the past 25 years, Denmark has captured about half the world wind-turbine market, a market worth $1.5 billion dollars in 1999. Wind supplies about 12% of Denmark's electricity. Other countries with rapidly expanding wind generation capacity include Germany, the United States, Spain, Italy, the Netherlands and India. Although most wind developments are constructed on land, European countries, particularly those bordering the Baltic Sea, are beginning to develop extensive offshore wind farms. This approach responds to a shortage of acceptable onshore sites, better offshore wind regimes, and the cost efficiencies of the very large machines used offshore.

The total active wind turbine capacity in Canada is about 142 MW. Canada's largest wind development is Quebec Hydro's 102 MW Le Nordais project in Gaspe. Most of the remaining wind generation capacity is in southern Alberta, which has one of the best wind resources in Canada and boasts approximately 39.5 MW of installed wind-generation capacity. In Saskatchewan, a project is nearing completion that will provide wind-generated electricity for 25% of the federal government consumption in Saskatchewan for 10 years. A second planned project will provide up to 17% of provincial government demand for 10 years. The government of Saskatchewan is committing $500,000 to purchase this electricity. Both projects will operate through Sask Power, the Crown corporation.

The Canadian Wind Energy Association (CanWEA), with 90 members, represents the wind energy industry, providing leadership and vision for the development of wind energy in Canada. CanWEA's stated goal is to install more than 10,000 MW of wind power capacity by 2010, providing about 5% of Canada's electricity from wind.

Many jurisdictions in the United States and Canada have recognized the potential value of wind generation and have developed incentives to encourage it. Some states have sales tax exemptions or income tax credits (generally with some form of upper limit) available to project proponents. Others have instituted production credits, accelerated depreciation tax provisions, or property tax exemptions for the value of renewable-energy capital equipment. In Canada the Income Tax Act allows wind electricity generation systems to deduct the cost of eligible equipment at up to 30% per year on a declining balance basis. Canadian renewable and conservation expense provisions allow all the costs of test wind turbines, resource assessment, and other project development activities to be deducted in the year costs are incurred.

Increased wind-powered electricity generation also has direct economic benefits to the community. For example, an emerging wind-generation industry presents opportunities for investors, business opportunities for IPPs that also create spin-off economic activity in the local economy, and payments to rural landowners who may lease their land for installation of wind turbines.

However, there are also disincentives to wind-energy developments in some jurisdictions, principally capital taxes and property taxes. Capital taxes represent a disincentive to new investment in as much as the products of that investment incur an increased tax burden. Property taxes result in the capital cost of a wind turbine or other renewable project being taxed. Some U.S. states grant long-term exemptions, but others either provide an initial exemption period that eventually disappears or limit taxes to the equivalent value of conventional power generation facilities of the same output or capacity. On the other hand, property taxes from a wind turbine development could be seen by the local community as one of the benefits of the project.

Environmental Impacts

Wind and Solar

Because they don't burn fossil fuel, wind turbines and solar energy produce almost no harmful emissions. Associated savings depend on the source of the energy displaced. In addition, no CO_2 is released, which helps in reducing emissions linked to climate change.

Wood Combustion

Trees consume CO_2 and store carbon in their roots, trunks, branches, and leaves. Forest growth created through sustainable wood harvesting practices can remove more carbon from the environment than burning wood produces. As a result, the net climate change impact of burning wood efficiently is usually considered to be zero.

Efficiently burned wood produces only carbon dioxide, water, and heat. Wood burned with an insufficient air supply or at too low a temperature can produce emissions of environmentally undesirable compounds. Research and improved appliance design have resulted in wood stoves and fireplaces that burn much more cleanly and efficiently than conventional equipment.

Wood appliances tested and certified under the U.S. Environmental Protection Agency (EPA) or Canadian Standards Association (CSA) B415 emission standards can burn up to 30% less wood and reduce particulate emissions by over 90%. EPA approval has been required for every wood appliance sold in the United States for over a decade. British Columbia has required EPA certification since 1994.

Eliminating low-efficiency and high-emission wood appliances from the marketplace has improved ambient air quality, reduced health impacts, reduced creosote formation, and resulted in homeowners getting more heat and value from the fuel they burn. Wood burning in Nova Scotia currently accounts for one-third of small particulate matter released into the atmosphere. Use of approved wood appliances can significantly reduce these emissions. Fuel savings typically recover any additional costs of EPA-certified equipment within the first few years of use. EPA-certified wood appliances are widely available at a reasonable cost.

Financial Impacts

Electricity generated from renewable resources has become significantly less costly with improvements to technology and efficiency. Some of the technologies (wind, for example) can produce electricity at a price competitive with conventional generation in some jurisdictions, and only slightly higher in other locations. The cost of using renewable resources is primarily a function of the capital cost of the equipment. Fuel costs are low or zero for most renewable technologies, leaving only the operation and maintenance costs to escalate in the future. This provides a natural price hedge against future fossil-fuel price increases.

Renewable Energy Use in Nova Scotia

Biomass

Biomass remains an important source of heat in Nova Scotia. More than 100,000 households, including many rural and low-income residents, rely on firewood to meet at least part of their annual heating requirements. Residential use of wood fuel tends to increase as the price of competing fuels increases.

Large industrial firms currently use approximately 1.2 million green tonnes of wood waste to generate electricity and supply process steam and heat to pulp and paper plants, lumber kilns, greenhouses, and manufacturing operations. Waste biomass is also used as a feedstock to produce fuel pellets for use in Nova Scotia, and for export.

The largest biomass-burning facility in the province is the Brooklyn Energy Power Corporation. This 25 MW cogeneration plant sells steam to a Liverpool area pulp and paper facility and electricity to Nova Scotia Power. The plant burns approximately 450,000 t of waste wood products annually.

Wood-burning heating plants at several large institutional sites burn a further 17,000 to 18,000 green tonnes of fuel chips produced specifically for fuel.

Wind Energy

Large utility-scale wind turbines can now produce electricity at a cost approaching that of conventional power. Today's most cost-effective machines typically have capacities in the one-megawatt range and have tower heights upwards of 80 m.

A number of wind developers are currently investigating Nova Scotia's potential for wind farm development. NSPI received more than 20 responses to a recent expression of interest issued for 50 MW of wind power from independent producers and has announced plans to erect two of its own 600 kW turbines in the province. The utility has received permission from the UARB to purchase the two units. It plans to file a request for UARB approval to launch a green power program in Nova Scotia and is in the final stages of negotiating a green power purchase agreement with the federal government.

Available information suggests that Nova Scotia has areas with good potential for wind generation. However, information on the nature of the wind resource in Nova Scotia, at the level of detail required by wind developers to finance a project, is still limited. For the most part existing data, or data currently being collected, are privately owned and proprietary. To ensure optimal siting and construction of wind farms, and to ensure maximum efficiency and utility, future developments will require systematic wind-resource information that accurately represents the relevant wind regime over the course of the year.

A major demonstration project for wind generation, under a federal government renewable energy incentive program, has been announced in Prince Edward Island. Eight turbines with an estimated annual output of 16.6 million kWh per year are being installed by the P.E.I. Energy Corporation near Cape North. The federal government has already agreed to purchase 48 MWh of green power annually in P.E.I., Saskatchewan, and Alberta.

A Dartmouth company, Atlantic Orient Canada, manufactures 50 kW wind turbines. These units are cost competitive in off-grid areas that would otherwise require electricity from a diesel generator. Last year, TurboWinds Canada announced plans to build a wind turbine manufacturing facility in the Amherst area. Federal government funding was also approved to install 100 kW of wind capacity on Sable Island to supply the needs of government installations on the island.

Passive Solar

Most buildings obtain some free heat from the sun. Capturing the sun's energy through south-facing windows can provide 30% to 60% of annual heating requirements. The key components for superior solar performance are careful design, energy efficient windows, and an energy efficient building envelope. Passive solar construction is cost effective at today's energy prices, but it requires the thoughtful integration of building design with the natural features and topography of the building lot. Hundreds of passive solar houses have been built over the past few decades in Nova Scotia.

Past initiatives to support the design of passive solar houses have included a design manual, a 20-minute video, a fact sheet outlining basic design principles, and training courses attended by more than 1,000 new homeowners and design professionals.

Active Solar

Active solar systems mechanically move heat from solar collectors to the site of intended use. They usually work best in lower-temperature applications, such as domestic hot water or pool heating. Active solar systems can also supply space heat by either preheating ventilation air, or in combination with low-temperature-radiant or fan-coil heating systems. The largest solar panel manufacturer in Canada, Thermo Dynamics Ltd., is located in Burnside. The company exports about 95% of its product.

Photovoltaics

A worldwide research effort continues to improve the performance and cost effectiveness of photovoltaic systems, but per-kWh costs continue to be much higher than for electricity purchased from the utility. Photovoltaic systems have proven to be a dependable, easy to maintain source of electricity for remote applications. Typical uses include personal electronic devices, navigational aids, outdoor lighting, marine applications, water pumping, and camp or cottage use. The installed capacity is growing quickly as a result of aggressive utility and government incentive programs in the United States, especially in hot climates where the peak output of a solar panel exactly coincides with system peaks caused by air conditioning loads. Former U.S. President Clinton initiated a "million solar roofs" project to spur the development and implementation of more solar products across the United States, and several multinational oil companies (e.g. British Petroleum and Shell Oil) have made substantial investments in the photovoltaic industry.

Small Hydro

There are still a number of potential sites for hydro development in Nova Scotia. Salmon habitat issues, local opposition, and environmental regulations make it difficult, time consuming, and costly to obtain a permit to construct a new dam. Run-of-river installations are also an option.

Tidal Power

The Annapolis Tidal Generating Station has a capacity of 20 MW and has operated reliably since 1984. The feasibility of building a large-scale tidal project in the Bay of Fundy was extensively investigated in the 1970s and early 1980s. The project was abandoned due to its high cost, the cyclical nature of power production, fish mortality, and the impact the project was predicted to have on maximum tidal heights on the eastern seaboard. Smaller tidal-flow generators could be cost effective and environmentally acceptable.

Geothermal Energy

Conventional geothermal energy from hot springs does not exist in Nova Scotia. However, there are about a dozen mine-water geothermal systems in the Springhill area. These facilities have reduced their energy costs by installing heat pump systems that use warm mine water from the depths of abandoned coal mines as a source of heat. Both the federal and provincial governments provided funding toward the infrastructure development of these projects. Groundwater and ground-source heat pumps have been installed in a number of institutional and commercial facilities throughout the province, and homeowners use the technology to exploit renewable energy at the household scale. This type of geothermal heat remains a viable option using mine waters in the Springhill area, but commercial retrofit application elsewhere in Nova Scotia is limited by high capital costs and the scarcity of mine workings flooded with warm water. In new residential and commercial construction, ground-source heat pumps may provide a cost effective solution for buildings requiring both heating and cooling.

Hydrogen

Hydrogen has many characteristics of the ideal fuel. It is the most abundant element in the universe and when burned produces only water. Its use is currently hampered by the lack of production facilities, storage, and refueling networks. It requires a significant energy input to produce hydrogen from water using electrolysis or by steam reforming of natural gas.

Fuel cells could create a large demand for hydrogen fuel over the next decade. Packaged electrical generating systems and prototype buses and automobiles powered by hydrogen-based fuel cells exist today. Several major automobile manufacturers hope to mass produce fuel-cell powered vehicles within the next five years. Fuel cells may also become the system of choice for distributed or remote electrical generation.

Public Advice

Nova Scotians expressed a strong interest in renewable energy sources and their potential role in the province's energy future. Many Nova Scotians are familiar with the global rapid growth of renewable energy, particularly wind power, and with the direct link between increasing renewable energy sources and the corresponding decrease in the environmental impact of fossil fuel based electricity generation. Government was urged to take a long-term view and to start looking beyond the time when fossil fuels will be a viable source of electricity by beginning to build a sustainable energy industry based on clean, renewable, and sustainable sources.

Analysis

Nova Scotians can benefit from the greater use of renewable energy, especially utility-size wind turbines, in a number of ways. Renewable energy projects are an extremely effective long-term method of reducing pollution and greenhouse gas emissions. The development of new renewable energy projects will decrease Nova Scotia's reliance on imported energy and create business opportunities for local industry and independent power producers. Non-renewable energy sources are ultimately finite (although the timelines are presently unknown) and can best be viewed as a bridge to a new energy future that will probably be based on more sustainable energy sources.

Wind is our most likely source of cost-effective renewable electricity in the short term. One of the biggest impediments to the development of a large-scale wind energy industry in Nova Scotia is the regulated-monopoly structure of the industry and lack of access to the transmission system and customers. As response to the recent call for wind energy proposals by NSPI has demonstrated, there are entrepreneurs who believe that wind presents an economic opportunity. Given an appropriate regulatory framework, wind has the potential to add a new dimension to our energy sector.

To meet the objective of increasing renewable energy generation capacity in Nova Scotia, the province will develop a regulatory framework for a green-power program that encourages the use of renewable energy to generate electricity. Independent power producers (IPPs) that generate power from renewable energy sources will be allowed to wheel power for a fair transmission charge and to sell directly to retail customers rather than indirectly through the existing utility.

Green-power initiatives have been successfully implemented in more than 80 jurisdictions in the United States and one in Canada. Several Canadian utilities (including NSPI) are close to starting their own programs. Green-power rate structures instituted in many jurisdictions provide customers with the opportunity to voluntarily pay a small premium to support the development of new renewable-based electrical generation. Typically, there is widespread customer support for the program; commonly, 3-5% of residential consumers participate, and program uptake is usually limited by availability of electricity that meets green standards rather than by customer constraints. Depending on the pricing structure, programs in the United States involve a price premium ranging from 1 to 5 cents per kWh, or a sale of blocks of green power to utility customers at a fixed dollar premium per month.

Purchase Rate Structure

Despite rapid advances in technology in recent years, renewable energy, including wind, is currently not cost competitive with Nova Scotia's thermal coal plants. Therefore, no green-power producer will be able to operate successfully if forced to sell power at the utility's marginal cost. As in other jurisdictions where green power has been successfully promoted, a green-power purchase rate will be required. This rate will be developed by the UARB and NSPI and should cover all rate classes. IPPs generating green power with direct access to customers will be allowed to sell at a negotiated market-based price.

Renewable Portfolio Standard

Many jurisdictions that have introduced programs to encourage green power have also established a renewable energy portfolio standard (RPS). Creating an RPS requires that the utility set targets and dates for the inclusion of new renewable energy capacity. The RPS is a target that the utility must reach and maintain, and is typically expressed as a percentage of the utility's capacity. RPS is beneficial from a number of perspectives: it helps to diversify energy supply, promotes environmentally friendly forms of electricity generation, and creates initial demand to spur the development of an economic renewable energy industry. The RPS results in a small increase in cost to consumers because the cost of the renewable energy purchase is spread across system users.

The UARB will be asked to approve a number of renewable energy policies. It is proposed that independent power producers (IPPs) employing renewable energy generators sited in Nova Scotia be given open access to the NSPI transmission system to wheel "green" power directly to customers if they so choose, or to sell to NSPI for a price that is at least equivalent to NSPI's average system cost, subject to system balancing, connection, economics, and ancillary costs.

The province and NSPI will create a short-term voluntary renewable target for new IPP generation totalling 2.5% of NSPI's current generation capacity. The province and NSPI will monitor the voluntary target for three years and then establish a longer-term Renewable Portfolio Standard (RPS). Green power purchases will initially be voluntary. To achieve higher volumes of green-power production, it is anticipated that a premium price will have to be charged at some point. This small green-power premium would be rolled into NSPI's regulated cost-of-service base and be applied to the electricity rates of all Nova Scotia electricity consumers. Current estimates indicate such an increase would likely occur in years three to five and be less than one-half of one percent.

Green Power Programs

To support and encourage new renewable electricity generation, the provincial government will make voluntary green-power purchases for its consumption at a premium price. Municipal governments will also be encouraged to participate. Government participation in green-power initiatives is important to demonstrate leadership and convince other groups to make their own commitment to purchase green power. Prince Edward Island recently leveraged a 10-year green-power commitment of $1.1 million into a $4.5 million contribution by Natural Resources Canada, as well as additional participation from Maritime Electric Limited customers.

Voluntary green-power programs have proven in many U.S. states to be an effective way to raise the funds needed without affecting the overall rate base.

For green-power programs to be successful, consumers must be assured that the power they buy meets agreed environmental standards. In some jurisdictions, problems have been encountered when disagreements arose over the definition of "green power", and what constituted green power for the purposes of the program. Clear definitions will be developed, as well as monitoring, to ensure that green-power programs achieve their stated targets.

Net Metering

Net metering essentially allows the electricity meter for customers who generate some proportion of their own electricity (e.g. farmers and small rural enterprises) to measure electricity flows in both directions. Small, household-sized private generators can input to the grid any excess electricity generated during times of low demand, to be recovered when demand exceeds output from the generator. Net metering is permitted for small renewable-energy projects in many jurisdictions in North America, and has also been permitted on an informal basis in Nova Scotia for over a decade.

Nova Scotia will formalize NSPI's present policy of allowing net metering for renewable energy systems and establish through the UARB a specific category under NSPI's rates and regulations. Nearly all net metering provisions in North America have upper limits low enough not to be applicable to a utility-scale generator. The EMGC will recommend the maximum capacity for systems to be eligible to participate.

Net metering improves the economics of small independent power systems by ensuring that all electricity produced can be used without the need for an expensive battery system. Equipment needed to permit safe interconnection has also become much less expensive. Given the current economics of small-scale electrical generation at this time, NSPI is unlikely to have many requests for net metering, but its availability does demonstrate support for small renewable projects. The utility is actively working with electrical and electronics manufacturers to develop safe, reliable, and low-cost equipment that will allow individuals such as farmers to interconnect micro-generation units (typically less than 50 kW) with NSPI's system. As implied by the term "net metering", customers partially offset the cost of their purchased energy by the quantities they bank with NSPI from using their micro-generators.

Geothermal Energy

Access to geothermal energy is regulated under the Mineral Resources Act. In the Act, geothermal energy is defined as a mineral, and rights to explore for and develop geothermal energy are issued under guidelines that are appropriate for minerals, but not necessarily energy. This has led to difficulty within government in defining the requirements for issuing appropriate licences and permits for geothermal energy, and frustration by project proponents who seek to have their rights to the resource defined prior to investment. The province will review the legislation to determine if the interests of the province are best served by the current legislative provisions, and whether changes are necessary to promote and encourage the development of geothermal energy in Nova Scotia.

Wood-burning Stoves

The energy strategy recognizes the need to reduce particulate emissions, and to improve the efficiency and safety of wood appliances.

Technical improvements to the combustion design of wood-burning appliances as a result of EPA legislation in the United States have led to the development of wood-burning equipment that is fuel efficient, has very low particulate emissions, and is competitively priced. Wood appliances that meet EPA standards benefit surrounding property owners who are otherwise negatively affected by pollution from inefficient wood burning. Nova Scotia will establish minimum efficiency standards for new wood-burning appliances sold in the province.

The Canadian wood burning industry has also substantially improved the safety of wood burning installations by instituting Wood Energy Technical Training (WETT) programs to train installers, chimney sweeps, and inspectors. Since these programs were developed in the early 1990s, wood-related fatalities and insurance claims have steadily dropped. Nova Scotia will adopt standards that require new wood stove installation to meet WETT certification.

Information Programs

For renewable energy sources to be widely accepted in the marketplace, consumers will need access to good information about the benefits and costs involved in using energy from these sources. Homeowners and business can incorporate a wide range of technologies and products into new construction or major renovation projects. Examples include passive solar design, day lighting, energy efficient windows, and construction, lighting, and mechanical systems. Programs will be developed to show how these technologies can benefit both the environment and the bottom line. They will specifically target homeowners and industry-based training initiatives.

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Part V

Coal

Seizing the Opportunity

Volume 2

Nova Scotia's Energy Strategy

NOVA SCOTIA

Part V Coal

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Coal

Statement of Principle

Recognizing that coal will remain the principal fuel for electricity generation in the near term, Nova Scotia will encourage the use of indigenous coal where environmentally and economically appropriate, promote reclamation mining in lands previously disturbed by mining, and encourage development of clean coal technologies.

Coal will continue to be a primary fuel source for North America and Nova Scotia in the foreseeable future. The current coal-fired thermal plants in Nova Scotia have a remaining economic life of between 5 and 20 years, and it is economically preferable that they continue to operate for the duration of their economic lives if this can be achieved in the context of environmental constraints. However, additional coal-generating capacity will depend on the development of economically feasible and technically efficient forms of clean coal technology that deal with concerns about both air pollutants and greenhouse gas emissions.

Nova Scotia still has significant reserves of coal in the ground. Coal mining, when done in an environmentally responsible manner, can provide significant economic benefits to the province and to the communities near the resource. Nova Scotia will continue to support the development of indigenous sources of coal where environmentally and economically feasible, and will encourage responsible surface coal development projects, particularly those that assist in the reclamation of land affected by historical mining.

Burning coal to produce electricity has environmental impacts. Technology can significantly reduce the emission of some harmful substances, and development work is underway to increase the scope and efficiency of these technologies. Nova Scotia will encourage and support research and development related to clean coal technologies that can lead to better environmental performance and increased cost efficiency.

Government Role and Responsibility

The province owns the coal resources in Nova Scotia. It acts as promoter of the resource to the private sector, maintains a geoscience database and resident expertise in matters related to coal geoscience, manages the exploration, development and mining of coal under a system of licences and leases, and collects royalties on coal production, all under the authority of the Mineral Resources Act. The province also regulates the environmental performance of coal mines through the Environment Act and matters related to occupational health and safety in mines through the Occupational Health and Safety Act, with the exception of the Cape Breton Development Corporation (CBDC) operations which are subject to federal regulations for occupational health and safety.

The province has a role to play in helping to provide for the reclamation of lands disturbed by coal mining, including enforcing reclamation, establishing and holding reclamation bonds, and encouraging reclamation mining, which can restore large tracts of land in Nova Scotia coalfields from an unsafe, variably derelict state to a productive state that can benefit the community.

The federal and provincial governments share responsibility for environmental standards related to air pollution through the Canadian Environmental Protection Act (federal) and the Environment Act (provincial). The federal government also has responsibilities under international agreements, such as the 1991 Canada-U.S. Air Quality Agreement, the 1994 UN-ECE Second Sulphur Protocol, and the Kyoto Protocol on climate change, as well as federal-provincial initiatives such as the Canada-wide Acid Rain Strategy Post-2000. The federal government is moving toward national standards for most air pollutants and is engaged with provinces and territories in a national process to determine the costs and benefits of ratifying the Kyoto Protocol and implementing its provisions. The province has a role to work with Ottawa in developing these standards and implementation plans.

Strategy Objectives

- To meet environmental air quality standards in economically efficient ways that minimize stranded costs.
- To support the development of indigenous coal sources for use in Nova Scotia where economically feasible and environmentally appropriate.
- To encourage land reclamation in present and former coal mining areas through reclamation mining, recovery of coal from previously disturbed mine sites, and restoration of the land following removal of the coal.
- To support the development of clean coal technology to enhance opportunities for coal use while managing environmental impacts on the atmosphere.

Actions to Achieve Objectives

2001-2005

- Work with Nova Scotia Power Inc. (NSPI) on its plans to meet environmental targets and on establishing the role for indigenous coal in future electricity generation in Nova Scotia.
- Work within the national climate change process to ensure that Nova Scotia's interests with respect to coal-fired thermal electrical generation are taken into account.
- Maintain an up-to-date, publicly available inventory of the province's coal resources, including available information on coal quality and parameters affecting its use and environmental impacts.
- Inform the public, through a public awareness campaign, of the value of coal mining and the opportunities it presents for land reclamation in and around communities, and local economic development.
- Ensure the orderly surrender of the CBDC mining lease.

- Establish a development plan for surface coal in the Cape Breton coalfield and a process to licence or lease the coal resources to new private sector operators.
- Work with CBDC to establish a reclamation plan for CBDC lands with environmental liabilities.
- Work with NSPI and Nova Scotia universities to monitor the existing technology and new developments in clean coal technology, and opportunities for research and development in Nova Scotia.
- Provide research and development credits for clean coal technologies that address environmental issues.

2006-2010

- Monitor research, and implement developments in clean coal technology.
- Monitor developments in alternate or unconventional means of coal utilization (e.g. *in situ* gasification).
- Encourage indigenous coal production, including reclamation mining in previously disturbed lands.

Links to Energy Strategy Themes

Developing clean coal technology, including methods to reduce CO_2 emissions, will allow Nova Scotia to meet environmental standards while continuing to maintain coal as a component in an increasingly diverse energy mix, thereby helping to **Secure our Future**. Requiring any new coal-fired plants to use clean coal technology to reduce emissions of pollutants and greenhouse gases, and encouraging reclamation mining to restore damaged lands to productive use and correct environmental problems related to past mining practices, will help **Improve the Environment**. By encouraging development of indigenous coal resources, we provide for continuing economic opportunity for our coal mining areas and reduce the export of jobs and money to offshore coal producers. In doing these, we help to **Power the Economy**.

Background

Nova Scotia's Coal Mining Industry

Coal is the dominant fuel for electrical power generation in North America and in the world. It is an abundant energy source, safe, often domestically produced, relatively stable in price, easily transported, and widely distributed and available. It is a lower-cost energy source than any other fossil or nuclear fuel alternative, and is thereby particularly suited for base-load power generation.

Coal mining is conducted in five provinces in Canada (British Columbia, Alberta, Saskatchewan, New Brunswick and Nova Scotia), with a total annual production of 75 million tonnes (t). In 2000, Nova Scotia produced approximately 1.1 million t, or 1.5% of coal production in Canada. Coal is consumed in each of the five producing provinces; Ontario and Manitoba, which do not produce coal, also consume significant quantities.

Nova Scotia's abundant coal resources have been used to fuel the industrial and economic growth of the province since coal mining started in Cape Breton in the 1720s. Between 1863 and 2000, more than 400 million t have been produced from the major coalfields of Nova Scotia which include:

- Sydney coalfield (Port Morien district, Glace Bay district, New Waterford district, Sydney Mines district, New Campbellton district),
- Inverness County coalfields (Port Hood, Mabou, Inverness, St. Rose-Chimney Corner),
- Pictou coalfield (Westville, Thorburn, Coalburn, Stellarton),
- Cumberland County coalfields (Springhill coalfield, Joggins-River Hebert coalfield),
- Kemptown-Debert coal area,
- Richmond County coal area, and
- Glengarry (Loch Lomond) coal area.

Between the early 1900s and the mid 1960s, Nova Scotia's annual coal production was between 4 and 6 million t, reflecting a strong demand from robust iron and steel, transportation, and energy industries within the province, as well as a significant coal export market. Although traditional markets declined in the 1960s, by the early 1970s a world oil crisis resulted in significant increases in fuel oil prices and renewed demand for coal. Concerns over the price and security of fuel supply for electrical power generation in the province led the provincially owned electrical utility to construct new coal-fired power generating plants, which provided increased coal markets for Nova Scotia's mining industry. The development of new mines in the Cape Breton coalfield (Prince, Lingan, Phalen) led to a strong coal supply in the province between 1975 and 1995. However, by the early 1990s, the original CBDC mines had closed or were approaching the end of their planned economic life. The corporation's newest mine, Phalen Colliery, experienced serious technical difficulties and eventually closed in 1999. In 2001 CBDC announced that it would close its last remaining underground coal mine, Prince Colliery, by the end of the year. These mine closures have resulted in a steady decline in the province's coal production since 1995. In 1996 NSPI started importing coal to meet its fuel requirements, only the second time in a century that coal was imported into Nova Scotia.

Nova Scotia depends on coal to fuel approximately 80% of its electricity generation. The value of coal mining to the province in 1999 was $103.5 million and the industry provided approximately 1,000 jobs. NSPI currently has the capacity to generate 1,238 MW from coal-fired generators in four locations (Table 1) that collectively represent an annual demand for about 2.8 million tonnes of coal. Coal generators typically are considered to have a useful life of about 40 years, and capital costs are amortized over this time period. The oldest units of the current NSPI coal generators have a remaining useful life of about 5 years (Trenton 5); the youngest, approximately 30 years (Point Aconi).

Table 1. NSPI Thermal Generation Capacities

NSPI power generating stations	No. units	Net Operating Capacity (MW)	Coal Consumed (t) *
Trenton #5 (coal)	1	150	400,0000
Trenton #6 (coal)	1	155	430,000
Point Tupper #2 (coal)	1	148	426,000
Point Aconi (coal) (petroleum coke)	1	165	189,000 (coal) 213,000 (coke
Lingan #1, 2, 3, 4 (coal)	4	620	1,663,000
Tufts Cove (heavy fuel oil/natural gas)	3	332	n/a
Total		1,228 (coal/coke) 332 (HFO/gas)	3,108,000 (coal)* 213,000 (coke)

*Coal consumption in 2000 was higher than normal (2.5-2.8 million t) due to high fuel oil costs to NSPI.

Nova Scotia's coal industry currently comprises seven small-scale, privately owned surface mines with a combined annual production of 300,000-400,000 t. The province's last underground coal mine, Prince Mine, closed in November, 2001 (Table 2).

Surface coal mines in Nova Scotia are typically small-scale operations. They provide jobs and economic activity for the community in which they operate, as well as the opportunity to remediate and reclaim lands that have previously been disturbed by mining. In many areas previous mining activities, both legal and illegal, have left a legacy of mine openings, subsidence, waste that can produce acid drainage, and abandoned infrastructure that render the land derelict. In many historically mined areas, there is a coal resource remaining near the surface that can be recovered by small surface mines. When the land is reclaimed after mining, this reclamation corrects not only the impacts of the recent mine but also the impacts of historical activities. Reclamation mining projects have the potential to reclaim large tracts of land disturbed by historical coal mining, and because the reclamation is carried out by the operator as part of the project cost, there is little or no cost to the province or the municipality.

Coal Resources

After 250 years of coal mining Nova Scotia still has significant indigenous coal resources that could be developed by conventional mining methods to supply the provincial coal demand. Some of these resources are identified in Table 3. This listing is not an exhaustive inventory. The largest single coal resource remaining in the province that can be mined by underground methods is the Donkin resource. A large number of available surface coal resources remain, many of which are in historically mined areas and provide opportunities for reclamation mining. Opportunities for reclamation mining are particularly prevalent in the Sydney coalfield, most of them areas included in the CBDC mining lease. These resources will return to the Crown when the corporation surrenders its lease, expected in late 2001 or 2002.

Table 2. Nova Scotia Coal Production, 2001.

Company	Mine	Operation Type	Ann. Capacity (t)
CBDC	Prince Mine (closed Nov. 2001)	underground colliery	1,500,000
Pioneer Coal Company (and related companies)	Stellarton Mine	reclamation open pit	210,000
	Evans Mine	reclamation open pit	50,000
	Coalburn Mine	open pit	50,000
	Thorburn	reclamation open pit	final reclam
Brogan Mining Limited	Little Pond	reclamation open pit	50,000
Cape Crushing Limited	Cape Crushing	reclamation open pit	24,000
Hill Reclamation Limited	Springhill	reclamation Railbed	14,000
Total			1,898,000*

*This value represents the cumulative annual capacity of all mines, not annual production.

It is possible that research now underway into unconventional methods of mining coal, such as *in situ* gassification, may in the future render feasible the development of coal resources that are too deep or of too low a quality to be considered for conventional mining. These coal resources could also be prospective for coal-bed methane. In the event that new mining technologies are developed that can exploit such resources, there are potentially much larger reserves in Nova Scotia than those summarized in Table 3.

Royalty

Nova Scotia's royalty rate for coal, prescribed in section 174 of the Mineral Resources Regulations (SNSN 1990 c.18) at $0.25/ton ($0.276/tonne), is the second-lowest in Canada. The province also collects revenue in the form of an annual mining lease rental fee, which mining companies pay for the privilege of maintaining "exclusive right" to the lease area for some specified period of time (usually 20 years). The mining lease rental rate in Nova Scotia is currently set in the Mineral Resources Regulations at $80/claim/year (1 claim = 40 acres, or approx. 16 ha).

Environmental Impacts

The use of any hydrocarbon for power generation carries an environmental cost. Specifically, burning coal produces emissions of sulphur dioxide (SO_2), particulates, nitrogen oxides (NO_x), carbon dioxide (CO_2), and trace metals that may include mercury, lead, and cadmium, depending on the composition of the coal. SO_2 and NO_x emissions contribute to acid rain, particulate matter and NO_x contribute to smog, and CO_2 is a greenhouse gas (GHG) believed to be a cause of global climate change. Trace metals (mercury in particular), NO_x, and particulates affect air quality and pose health concerns.

Table 3. Selected Nova Scotia Coal Reserves Suitable for Conventional Mining.

Coal Resources	Mining Method	Status	Reserves (million tonnes)	Sulphur (approx. %)	Ash (approx. %)
Prince Colliery (Point Aconi)	Underground	inactive, CBDC	15	3.5	12
Donkin Resource Block	Underground	inactive, resource available	>200	4.5	12
Sydney Coal Field	Surface (reclamation)	2 active, resource available	11.5	3-6	8-18
Pictou Coal Field	Surface (reclamation)	2 active, 1 complete resource available	5.3	0.8-3	12-30
Western Cape Breton	Surface (reclamation)	inactive	1.2	1-7	6-15
Springhill Coal	Surface (reclamation)	inactive, resource available	>2	1-3	10-15
Total underground			>215		
Total surface			>20		

The GHG emissions issue is currently being addressed by Canada's National Climate Change Process, by which the Canadian federal and provincial governments are assessing the opportunities and costs of ratifying the Kyoto Protocol. There are two opportunities for the release of GHG during the coal cycle: methane trapped in coal can be released to the atmosphere during mining, and burning coal emits CO_2. The continued use of coal for electricity generation may be affected by any steps that Canada eventually takes to address global climate change, or by any fiscal instruments that are enacted nationally to encourage GHG emission reductions.

Coal mining can create environmental benefits, including site reclamation and positive socio-economic impacts. It can also cause negative environmental impacts, including changes to surface water and groundwater, terrestrial and aquatic habitat loss, air pollution, noise pollution, and archaeological impacts. These environmental impacts can be minimized through proper planning and design.

Clean Coal Technology

Coal accounts for 38% of the electricity generated worldwide (more than double any other single fuel source) and more than half (56%) of the electricity generated in the United States, a figure that has remained fairly consistent over the last five years. Recent reports from the U.S. Department of Energy (DOE) suggest that by 2020 the United States may consume about 22% more coal than today. The recently released U.S. energy strategy includes the construction of 1,900 new power plants, many of which will be fired by coal.

The resurgence in coal generation in the United States, and the expected continued increase in demand for coal worldwide, is expected to encourage research and development of clean coal technologies. "Clean coal technology" is defined by the World Coal Institute as "technology designed to enhance both the efficiency and environmental acceptability of coal extraction, preparation and use."

Many of these technologies are commercially viable and in use worldwide; others are still in research and development stages.

The scope of research into clean coal technology is worldwide and substantial. The U.S. DOE has leveraged funding of over US$5.3 billion for research into clean coal technology in the last 15 years, and the recent American energy strategy commits a further $2 billion in funding over the next 10 years. Clean coal technology research programs are prominently featured at a number of universities, and many developed countries that include coal in their energy mix sponsor clean coal technology programs. Industry associations also recognize the need for new clean coal technologies and are sponsoring research and development to improve existing technologies and develop new methods for meeting the environmental challenges of burning coal.

In general there are three types of opportunities for reducing emissions from conventional coal-fired generating plants:

- pre-combustion (e.g. using low-impurity coal and treating coal to remove sulphur, moisture, ash, and other impurities),
- combustion (e.g. high-efficiency burners and low-NO_x burners reduce emissions during combustion), and
- post-combustion (e.g. flu gas treatment using sulphur scrubbers or electrostatic precipitators to contain particulates).

Flue gas treatment methods and cleaner combustion technology have led to the substantial reduction of emissions from coal-fired power generation in the last 30 years. In the United States emissions of SO_2 have been reduced by 40% since 1970, even as coal consumption tripled. The unit emissions of sulphur pollutants have been reduced by more than 80%. This has been achieved by burning low-sulphur coals, using scrubbers to remove sulphur from the stack (flue-gas desulphurization), and increasing generating unit efficiency. Emission of particulates and other gases that affect air quality has also been reduced substantially.

The electricity generation industry has made significant gains in efficiency, which reduce the quantity of coal required to produce a unit of power, and consequently reduce emissions. Most of today's power plants burn pulverized coal, and achieve 33-38% thermal efficiency. Recently developed closed-cycle processes recover heat previously lost in exhaust gases and can increase efficiency to the 45% range. Generating unit designs using supercritical steam temperature technologies operate at efficiencies in the 42-45% range. In the future, the use of new advanced materials in coal-fired generating plants may enable efficiencies up to 55%.

Along with treatment methods to control emissions of conventional coal-fired plants, advanced coal combustion technologies have been developed. Fluidized-bed combustion, for example, in which the coal is mixed with a sorbent (usually limestone dust) prior to combustion in a bed fluidized on a stream of hot air, is the method used by the NSPI Point Aconi plant. Another promising technology is Integrated Coal Gasification Closed Cycle (IGCC), in which the coal is turned into a gas (syngas), which is combusted in a gas turbine. Heat is recovered from the gas turbine exhaust gas and used in a steam turbine generator, thus forming a combined cycle. The IGCC process substantially reduces emissions and operates at higher efficiency (approaching 45%) than typical pulverized-coal generating plants. Advances in gas turbine technologies have the potential to increase efficiency to levels above 50%. There are three commercial-scale IGCC demonstration plants now operating in the United States and four in Europe.

Research is also underway into the development of a closed cycle coal-coal gas hybrid system, in which the residual "char" after gasification of the coal is burned to produce steam. Efficiencies of over 50% may be achievable using this technology.

Significant research is being carried out to reduce greenhouse gas emissions from coal combustion. Increasing the thermal efficiency substantially reduces CO_2 emissions (an increase from 35% to 45% in thermal efficiency can typically reduce CO_2 emissions by 20-30%). Alternatives for reducing greenhouse gas emissions include capturing and storing CO_2 emissions from coal-fired generating stations and sequestering the gas, for example in geological formations.

Gasification of coal may eventually provide a source of hydrogen for fuel cell applications. As well, there has been some work done on *in situ* gasification of coal, primarily in Russia where the method is successfully employed. This may ultimately provide a means of recovering coal resources that are either too deep or too low quality to be recovered by conventional mining methods.

One interesting research program is the Zero Emission Coal Plant currently being researched by the Los Alamos National Laboratory and the Zero Emission Coal Alliance. The process involves the anaerobic production of hydrogen gas from a coal/water slurry, the hydrogen then being used to produce electricity in a solid oxide fuel cell. Excess CO_2 is captured and sequestered. Mercury, lead, arsenic, and cadmium are of concern in coal-fired flue-gas emissions. Concentrations of these and other metals vary substantially by coal seam and by coalfield. Electrostatic precipitators can recover over 95% of cadmium and arsenic, but are less effective for mercury. Fabric filters (baghouses) are effective in controlling some trace metals, particularly when sorbents are used. Wet scrubbers, in combination with sorbents, can also be effective in mercury capture. Cleaning coal before burning can also reduce the emissions of heavy metals.

The installation of clean coal technologies to reduce emissions and improve efficiency generally comes at a price: additional operating and/or capital costs. These costs may limit the use of the technologies in applications where cleaner burning fuels such as natural gas are available at a competitive cost. There will always be a trade-off between cost and emissions; however, expectations are that the next generation of clean coal power plants will cost significantly less than the early pioneers and, depending on the cost of other energy sources, the application of even the more expensive clean coal technologies may be economically viable.

Public Advice

Nova Scotians are aware of the importance of coal to our economy. The majority of respondents to questions about the future of coal in Nova Scotia's energy mix expressed the opinion that coal is still a competitive alternative to other fuel sources and that as long as environmental standards can be met, coal should remain part of the province's energy mix. Arguments included the desirability of maintaining a diversity of energy sources and the need to keep electricity costs stable. Many respondents also felt that we should attempt to maximize the use of local coal resources and look for alternative methods of using coal-as a source of coalbed methane for example. The importance of research and development in the field of clean coal technology was emphasized.

A number of respondents and submissions were not in favour of the continued use of coal to generate electricity, mainly because of the impacts of coal burning with respect to air pollution and greenhouse gas emissions. They pointed out that if one considers full life-cycle environmental and health costs, then coal may not be the most economic fuel.

Analysis

Worldwide, coal is by far the most abundant source of fossil-fuel energy. Proven global coal resources are widely dispersed geographically, and are estimated to hold more than 200 years' reserves at present production rates. In contrast, some 70% of oil and gas reserves are in the Middle East and the former Soviet Union, and can provide 45 to 60 years at current production rates. Coal prices are typically among the lowest of hydrocarbon fuels, and the widespread and abundant coal reserves provide for both price stability and long-term price efficiency.

Clean Coal Technology

Coal is likely to be a fuel of choice in many parts of the world for the foreseeable future, and it will continue to present significant environmental challenges for the planet. Recognizing the importance of coal to future energy needs, many countries have initiated measures to mitigate the environmental impacts by investing significantly in clean coal technology. Clean coal technology may be particularly important to Nova Scotia, because of the relatively high sulphur contents of some of our coal, and the possibility of future requirements to reduce greenhouse gas emissions from electricity generation. Application of clean coal technology could potentially allow indigenous fuel sources to continue to contribute to our energy future. Generating at least some of our electricity from coal-fired plants will contribute to the diversity and overall price efficiency of our generation sources.

The downside of implementing clean coal technology at present is cost and, in some cases, incomplete technology development. Installing new clean coal technology on an existing plant can represent a significant capital investment in a plant that may have a limited life span. In Nova Scotia, additional capital costs would have to be recovered through the utility's rate base, putting upward pressure on the price of electricity.

It is recognized that technological solutions for one problem can exacerbate another. For example, installing SO_2 scrubbers in a plant such as Lingan may decrease the overall efficiency of the unit, thereby increasing CO_2 emissions. Current action to reduce SO_2 emissions in such a facility might, therefore, conflict with future actions to reduce CO_2 emissions, potentially stranding the costs of the SO_2 scrubbers, with attendant overall cost to the utility and, eventually, to consumers.

Technology to clean up the pollutants is available and, though currently expensive, likely to become cheaper as the technology finds increasingly wider application. For example, the Point Aconi plant is a fluidized-bed unit that can burn high-sulphur fuel with minimal SO_2 emissions. Clean coal technology is currently the subject of intensive research and testing, particularly in the United States, Japan, and Europe, and several large plants are under construction. However, technology to capture and sequester the greenhouse gasses is not as advanced, and economic solutions to the release of GHG are probably still some distance in the future. Proven, cost-competitive technology will be required to address all air issues related to coal-fired generation, both pollutants and GHG. For Nova Scotia to meet its environmental goals, new coal-fired generation in the province will require such technology.

Alternatives

The most economically efficient option for the existing coal-fired generation plants is to allow them to operate to the end of their economic life cycle. Early retirement of any coal-fired unit would result in stranded costs, the magnitude of which would depend on the size of the unit and the length of its remaining life. Any such action would also require early capital costs for construction of new generation capacity to replace the lost units. Adding these costs to the utility's rate base would translate into upward pressure on electricity rates. Similarly, converting coal-fired units to alternative fuels such as natural gas would be both capital intensive and potentially more expensive with respect to the fuel source. Natural gas is most competitive when it is used in specially designed and built combined-cycle plants rather than converted coal plants. Therefore, even a staged and planned move from coal to natural gas would result in additional costs rather than savings to energy consumers.

Nonetheless, action is required with respect to air emissions from coal-fired thermal plants. The measures in the energy strategy will make a real difference to our environmental performance, providing a clear signal that Nova Scotia takes its responsibilities seriously and expects other jurisdictions to do the same. The targets can be met without forcing either early closure or major new capital expenditures on the utility. Reductions in air contaminants can be accomplished by a combination of switching to cleaner-burning gas where feasible and using imported coal that contains less sulphur and generates lower levels of air contaminants than many indigenous coals.

The principal uncertainty in this scenario is the national climate change process which may mandate actions to meet national greenhouse gas emission-reduction targets. Any actions to reduce GHG in Nova Scotia will necessarily involve significant changes to the way we generate our electricity. Any steps that the federal government takes to reduce GHG emissions nationally will certainly affect the Nova Scotia economy, because generation of electricity by coal burning is a significant emitter of GHG. It is critical that the province continue to work within the national climate change process to ensure that the burden of national targets for GHG reductions is shared fairly across jurisdictions, and that Nova Scotia's interests are protected in any such process. Actions to reduce GHG emissions should, if possible, be staged so as to take full advantage of the natural economic cycle of the current coal-fired generation plants and, to the extent possible, minimize upward pressure on utility electricity rates.

Research and Development

Nova Scotia is unlikely to be a major player on the global stage of clean coal technology. However, any long-term future for coal in the Nova Scotia electricity industry, particularly new investment in coal generation (whether re-powering of existing generators or construction of new capacity), will depend on the development and implementation of appropriate technology to allow the industry overall to meet the province's economic and environmental goals. In the short term, the province should develop and support a capability in targeted research areas that can contribute to the development of these technologies, particularly areas that can directly benefit Nova Scotia. This could be done through making use of existing expertise in Nova Scotia universities, supported by public and private sector partnering, and incentives for clean coal research and development. In the longer term, the province must continue to monitor international efforts in this area and promote the use of any new technology that can contribute to environmental goals. To ensure opportunities to maintain coal as part of a diverse energy mix, our longer-term goals must allow for the flexibility to incorporate new technology when it is environmentally and economically feasible.

Indigenous Coal

Until fairly recently, Nova Scotia was self-sufficient in coal. This is no longer the case. Nonetheless, there are still opportunities for coal mining to contribute to the province's economy and to community development over the short and medium terms. Environmental targets should not be relaxed in favour of indigenous coal, nor should government financially support non-economic mining operations. However, where coal mining can provide a net benefit to the province and to the communities where it occurs, and where it is economically feasible and environmentally appropriate, the province will facilitate business opportunities in this sector.

An important factor in planning for the optimum utilization of the coal resource in the province is knowledge of its extent, quality, and characteristics. The province already has developed a significant geoscience database and in-house expertise on its coal resources. This database will be maintained, enhanced where necessary, put in digital format to the extent practical, and made available to any member of the public who requires information on the province's coal resources.

A second important factor is public acceptance of the continuation of a coal mining sector in Nova Scotia. The general public and community development agencies should be aware of the opportunities and benefits offered by coal mining. To this end, the province will renew public education and awareness initiatives.

Any future coal mining industry needs a regulatory regime that is fair, efficient, and non-discriminatory. The Department of Natural Resources already works cooperatively with the Department of Environment and Labour through the one-window process to expedite the processing of permits for mining operations. Government will continue to try to find ways to ensure that the regulatory regime meets the needs of industry, while protecting the environment and the safety of workers and the general public. The province has a role in this process to address public concerns with unbiased advice and technical information.

Probably the most significant opportunity for change in the mining sector will occur when the CBDC mining leases are surrendered to the province, expected in late 2001 or 2002. One significant remaining coal resource remains that can be mined by underground methods (the Donkin Block) and a number of coal seams could be recovered through surface mining. The province will develop a strategic plan and manage the process by which exploration licences and mining leases for the former CBDC lands can be granted. The plan will aim for maximum utilization of the remaining resource.

With the cessation of operations by CBDC, significant environmental liabilities will remain throughout the coalfield. The province is determined that CBDC and the federal government address these liabilities as part of their closure of CBDC operations. The parties have been meeting to reach agreement on which sites require remediation, and the extent of CBDC's responsibility. The province will continue to work to ensure that remediation of these lands is done properly, and to standards acceptable to the province.

Nova Scotia coal producers currently pay among the lowest coal royalties in Canada. In a national context, there is room for increasing coal royalties to a level that would give the province a return on the resource in line with other provinces. Increasing coal royalties to levels currently in place in Alberta and British Columbia (i.e., doubling the current Nova Scotia rate) would result in a net increase in revenue to the province of about $75,000 at anticipated (2002) production rates. Increasing them to comparable levels for Saskatchewan (quadrupling the Nova Scotia rate) would increase revenue by about $225,000.

It is recognized that most coal mined in Nova Scotia is sold to NSPI for electricity generation and increases in royalties can be passed on to the utility. Because the Utility and Review Board has traditionally considered such costs to be valid components of the utility's rate base, significant extra royalties on coal could result in upward pressure on electricity rates. As well, an increase in the royalty rate for domestic coal might result in a price disadvantage compared with imported coal, which currently supplies about half of Nova Scotia's demand. The higher royalties could return significant revenue to the province. If a significant coal industry with export potential develops, this policy should be reconsidered.

The legacy of 250 years of coal mining in Nova Scotia includes a large number of sites that have been left in a non-productive state following cessation of mining. In some cases, the land is not only derelict but hazardous, as a result of openings, acid-generating or metal-bearing waste, and near-surface subsidence. Whether legal or "bootleg" many operations have left land that cannot be used productively in its present state. There are now good examples of surface mining, where a company has recovered a remaining coal resource and in the process of reclaiming the land after mining, has returned derelict land to a productive state. This is a good model for environmental remediation. Everyone gains: the operator is able to recover a coal resource that would otherwise not contribute to the province's and the community's benefit, with accompanying direct and indirect jobs and spin-off economic activity; the community gets newly productive land and is relieved of the liability of potential hazards; and government gets royalties for the recovered mineral.

The province encourages reclamation mining, will facilitate this activity where economically, socially, and environmentally appropriate, and will consider reclamation potential as a determinant when processing tenders for coal resources in the province.

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Part VI

Environment

1. Climate Change

Seizing the Opportunity

Volume 2

Nova Scotia's Energy Strategy

NOVA SCOTIA

Part VI Environment

Section 1. Climate Change

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Climate Change

Statement of Principle

Global climate change is a serious problem on a planetary scale, brought about by the release of greenhouse gases produced by human activity into the environment. Nova Scotia is participating with federal and other provincial and territorial governments in formulating Canada's response to climate change, and is undertaking steps to reduce its greenhouse gas emissions.

The reality of human effects on the global climate through the release of greenhouse gases (GHG) into the atmosphere is no longer in serious dispute by most of the scientific community. Burning fossil fuels in our homes, our cars, and our industries is the single largest contributor to global climate change. We do not yet know the magnitude of GHG reductions that will be required of Nova Scotia in order to meet national reductions targets, but are participating in the national process in which the potential effects and possible solutions are being analyzed.

Climate change is a global problem and will require global solutions. Nova Scotia will continue to work with the federal, provincial, and territorial governments to arrive at a Canadian solution that meets our needs and is shared fairly across the country.

Government Role and Responsibility

The federal government has the prime responsibility for Canada's international commitments to GHG reductions. Canada has signed the Kyoto Protocol and it is ultimately a federal government decision whether to ratify it. Instruments by which national action on climate change might be effected (e.g. carbon taxes, emissions caps, and trading systems) are national in scope and must be enacted at the federal level. However, any decision for action on climate change must be informed and guided by input from provinces and territories because most sectors that must be part of the solution (i.e., energy, transportation, environmental regulation) lie within provincial/territorial jurisdiction. Nova Scotia has a responsibility to participate in the national process, to provide input and advice, and, most importantly, to ensure that Nova Scotia's interests are considered in any discussions leading to national action.

Strategy Objectives

- To work with the federal and other provincial/territorial governments to implement the National Implementation Strategy (NIS) on climate change.
- To ensure that all Canadian jurisdictions equally share the burden of implementing any national response to climate change.
- To implement a long term strategy to reduce greenhouse gas (GHG) emissions in Nova Scotia.

Actions to Achieve Objectives

2001-2005

- Continue to participate in the national climate change process and contribute to the National Implementation Strategy (NIS).
- Continue to negotiate with federal and other provincial governments to ensure that impacts of national actions with respect to climate change are shared fairly by all jurisdictions.
- Launch a provincial program to reduce GHG emissions in government operations.
- Support the creation of public education programs on global climate change.
- Maintain a regulatory framework that encourages the use of clean fuels such as natural gas.
- Work with the Union of Nova Scotia Municipalities to promote greater awareness of the need to reduce GHG and adapt to climate change in key areas such as buildings, transportation and land-use planning.
- Promote the development of innovative technologies and practices to reduce GHG.
- Make climate change a part of government decision-making.
- Continue to work with government to establish a system that ensures credit to business and industry for early actions on climate change.
- Encourage climate change related research.

2006 and Beyond

- Respond to national actions regarding reduction of GHG emissions.

Background

Climate Change in Perspective

Global climate change has been called the most significant environmental problem facing the world in the 21st century. Global climate change results from releasing greenhouse gases produced by human activities into the atmosphere. Since the Industrial Revolution, the concentration of carbon dioxide (CO_2) in the atmosphere has increased by 30%, and every year human activities release 28 billion tonnes of CO_2 into the atmosphere. If current emission trends continue, concentrations of atmospheric CO_2 is expected to at least double during this century. Even if greenhouse gas emissions were to stop immediately, the effects of past emissions on climate would persist for centuries.

The reality that climate change is principally caused by anthropogenic GHG emissions is now accepted by most people, governments, and companies. As Sir John Browne, Chief Operating Officer of British Petroleum, said recently: "We can't ignore mounting scientific evidence on important issues such as climate change. The science may be provisional. All science is provisional. But if you see a risk you have to take precautionary action just as you would in any other aspect of business." The vast majority of climate experts see evidence that we are experiencing a gradual warming of the earth's atmosphere, and sea levels are rising.

The Intergovernmental Panel on Climate Change (IPCC) stated in its July 2001 report that "there is new and stronger evidence that most of the warming observed over the past 50 years is attributable to human activities," that "human influences will continue to change atmospheric composition throughout the 21st century," and that change "will persist for many centuries." The IPCC predicts that the earth's average surface temperature will rise between 1.4 and 5.8°C from 1990 to 2100, significantly higher than its 1995 estimate of 1 to 3.5°C. Predictions of sea-level rise in the coming century range from 35 cm to 100 cm.

CO_2 emissions produced by the burning of fossil fuels represent by far the greatest contributor to human-induced climate change. In Nova Scotia, more than 92% of GHG emissions are created by fossil-fuel production, distribution, and consumption. Electricity generation accounts for 38%, transportation 27%, and the industrial sector 10%.

Some of the options for reducing emissions include: using renewable energy sources; switching to lower-carbon fossil fuels (e.g. oil to gas); energy efficiency; sequestration of carbon in agricultural soils, forests, or geological reservoirs; methane capture from landfills and underground mining; and emissions trading (the purchase of emissions credits from other entities).

International Efforts to Address Climate Change

The world's nations first signalled their intention to address greenhouse gas emissions when they signed the 1992 United Nations Framework Convention on Climate Change (UNFCC) agreeing to work towards stabilization of GHG emissions at 1990 levels.

In light of new scientific evidence, representatives from the world's nations met in Japan in 1997 at the Third Conference of the Parties (CoP3) and negotiated the Kyoto Protocol, which calls on 40 developed countries to reduce their GHG emissions for the period 2008–2012 by an average of 5.2% below 1990 levels, as a first step in a coordinated international effort to counter human-induced climate change. Canada accepted a target of 6%, the United States 7%, and the European Union 8%.

The Kyoto Protocol includes provisions for international emissions trading, the use of agricultural and forest sinks as storehouses for carbon, a balance between domestic action and international emission-reduction projects, and a compliance regime with penalties for failure to meet country-specific targets.

In July 2001, ministers meeting in Bonn reached political agreement on key issues regarding international emissions trading, carbon sequestration in agricultural soils and forest sinks, and penalties for non-compliance by countries that ratify the protocol. At CoP7 in Marrakesh in October 2001, broad agreement was reached on implementing the details of the Bonn agreement, setting the stage for a Canadian decision on ratification of the Kyoto Protocol in 2002.

U.S. President George W. Bush has said that his country will not ratify the Kyoto Protocol, but the United States did attend the sessions in Bonn and Marrakesh and is currently reviewing its climate change policy. Other Annex 1 countries (those with targets) are expected to decide on ratification in 2002—in time for the 10th anniversary of the UNFCC in September 2002 in Johannesburg, or the Eighth

Conference of the Parties (CoP8) in November 2002.

Canada's Response to the Climate Change Challenge

In December 1997 Canada's first ministers agreed to work cooperatively to assess the impacts on Canada of meeting its Kyoto target. They adopted four basic principles to guide climate change work in Canada:

- Canada must do its part;
- costs and options for reducing emissions must be known;
- all Canadians must participate; and
- no region or sector shall bear an unreasonable burden.

This national collaborative process is managed by the Joint Ministers of Energy and Environment. It involves more than 450 Canadians participating in a series of issue tables to analyze the potential effects of implementing various mechanisms to reduce greenhouse gas emissions. Nova Scotia has been an active participant in the national process. In October 2000 the joint ministers agreed to a national implementation strategy and a first business plan for national action on climate change (available at www.nccp.ca).

Federal government leaders have said repeatedly that Canada intends to live up to its Kyoto commitment. Nonetheless, it is important to recognize that GHG reductions will come at a cost, and it remains the position of provincial leaders that the analysis of costs and benefits must be completed before any final decision is made.

Public Advice

Many submissions emphasized the importance of global climate change as both a local and international issue. The public widely recognizes that climate change is a global problem, and that there must be a national process to address Canada's response to the Kyoto Protocol. Many submissions identified the need for a provincial action plan to support the national implementation strategy for climate change, as well as a longer-term policy approach that promotes efficient use of energy and long-term development of technology.

Analysis

The responses of governments, companies, and individuals to climate change will have a long-term influence on energy supply and demand in Nova Scotia. Action to reduce greenhouse gas emissions significantly will affect future fuel choices Energy sources that are significant GHG emitters (e.g. fossil fuels) will come at a higher cost while those with lower carbon content, or those such as wind, solar, hydro and biomass that are carbon neutral, will enjoy a price advantage.

Nova Scotia accepts the science of climate change and recognizes that action is needed locally, nationally, and globally to contain the problem. It is important that Nova Scotia be at the national table when decisions are taken regarding action to address climate change. The Nova Scotia government will continue to participate in the national climate change process, including active involvement in the National Air Issues Coordinating Committee on Climate Change (NAICC-CC). Nova Scotia agreed to the National Implementation Strategy, and since 1998 has implemented a number of cost-shared climate-change programs in partnership with the federal government to increase awareness and promote reduced GHG emissions in this province.

National action on climate change potentially poses difficult challenges for provinces like Nova Scotia that rely on coal for a substantial part of their electricity supply. To remain consistent with the principle that no region or sector will bear an unreasonable burden, it is important that there be national agreement on how the impacts of action on climate change will be shared. To this end, Nova Scotia will work toward a national agreement with federal and other provincial governments to ensure that impacts of national actions with respect to climate change are shared fairly by all jurisdictions.

In 1999, the Government of Nova Scotia held a round of consultations with stakeholders on climate change. These consultations led to the development of the Framework for Climate Change Strategy in Nova Scotia (see Appendix 1). This framework includes nine strategic actions, which are the province's first steps in addressing the climate change issue. They represent minimal cost (and in some cases may return energy savings) and are based on a phased approach to action, with periodic reviews and a flexible response to new scientific information and international events.

Among the actions is a "Government House-in-Order" program to improve energy efficiency in the provincial government's own operations and set an example for energy efficiency. Private-sector energy service companies (ESCOs) will be employed to retrofit government buildings to a more energy efficient state, and be paid out of realized savings. Except for the small cost of administering the program, there is no capital cost to government. When the contractor is fully paid back, energy savings revert to government. This type of program has already been successfully implemented in many other jurisdictions. As an example of possible savings, New Brunswick has successfully implemented a provincial buildings initiative, which resulted in an average of 20% energy saving in participating buildings. It is estimated that a similar level of success in Nova Scotia could eventually represent annual savings of $10 million to the province.

In August 2001, Premier John Hamm joined with other eastern Canadian premiers and New England governors in signing a joint Climate Change Action Plan (see <www.cmp.ca/press-neg.htm#2001>). The plan establishes regional goals for GHG emissions, placing the northeast region in the forefront of efforts to manage global climate change.

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Appendix 1. Creating a Framework for Climate Change Strategy in Nova Scotia

Climate Change: Understanding the Challenge

Climate[1] is one of the most significant, but least appreciated or understood, aspects of our lives. It is a common denominator that helps shape our economy, our environment, our health and indeed our lives. We tend to think and talk about climate as an independent phenomenon: something unconnected to our daily lives and something we are helpless to do anything about.

However, we are learning that climate and human activity affect each other in important ways. Leading scientists believe that human-induced changes to the climate are already taking place. They see evidence that we are experiencing a gradual warming of the earth's atmosphere and sea levels are rising.

Climate change is not just "someone else's problem." It is everyone's problem and we share responsibility to respond. Every contribution is important.

Nova Scotia faces two challenges in responding to climate change. We must take measures to mitigate the impacts of climate change by reducing emissions of greenhouse gases (GHGs). We must also prepare to adapt to climate change. Although we cannot yet be certain of the scope of climate-related change, we must be able to anticipate changes and effectively manage our response[2].

Almost 90 per cent of Nova Scotia's GHG emissions result from production and consumption of fossil fuels (see Existing Initiatives and Successes).

Energy producers may reduce their emissions by increasing the efficiency of production. Switching to less carbon-intensive energy sources is another way to reduce GHG emissions.

Nova Scotia: Predicted Impacts of Climate Change

Sea-level rise
- increase in coastal flooding and erosion
- move or rebuild some coastal roads, bridges, wharves, railways, etc.
- changes in coastal wetlands as fish breeding grounds, water purifiers and erosion and flood control zones

Precipitation changes
- greater percentage of rainfall in single events
- earlier and higher river flooding
- lower summer river flows with low flow periods starting earlier

Agriculture
- increased flooding of land protected by dykes
- more diverse and less predictable weather with more disease, changes in crop selection and new challenges for water management

Forestry
- added stress from changes in temperature and precipitation
- more damaging and costly insect infections
- changes in growth rates and dieback and number and severity of forest fires

Fishery
- some fish species decline or move, others prosper and new species appear
- communities, businesses and individuals need assistance to respond to changes in stocks

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[1] See Climate, The Greenhouse Effect and Fossil Fuels for a definition of climate

[2] Predicted impacts of climate change based on *Canada Country Study*

Consumers - including business, industry, households and individuals - make important choices which have an impact on GHG emissions (e.g. heating and cooling systems; transportation; recreation and leisure activities).

There are costs and benefits associated with taking action but costs will certainly escalate if we choose to ignore climate change and postpone taking action.

Climate Change: Canada and the International Community

In June 1992, Canada signed the *United Nations Framework Convention on Climate Change* (UNFCC) and agreed to work towards stabilizing its greenhouse gas emissions. In 1997, countries that signed the UNFCC met in Japan and agreed to the *Kyoto Protocol*, in which 40 countries were assigned targets to reduce greenhouse gas emissions by an average of about 5.2 per cent below 1990 levels for the period 2008 to 2012. Canada's target is six per cent below 1990 levels.

In December, 1997, Canada's First Ministers agreed to work cooperatively to assess the impacts on Canada of meeting the Kyoto target. First Ministers set out four basic principles to guide climate change work in Canada:

- Canada must do its part,
- costs and options for reducing emissions must be known,
- all Canadians must participate, and
- no region or sector shall bear an unreasonable burden.

Developing a Nova Scotia Strategy for Climate Change

Nova Scotians need to understand the economic, environmental and social impacts of climate change. We need to understand the choices we have and what actions will work best for us. Moving forward in the face of uncertainty is a challenge but we must find a way to do so.

Nova Scotia has always been willing to do its part to address environmental issues. Addressing climate change means reducing emissions from burning fossil fuel in our homes, our cars, and our industries. Emissions from using fossil fuel are believed responsible for not only the quickening pace of climate change, but also for other environmental problems like acid rain, smog, and mercury deposited in our environment.

We know we must contribute, we must be a part of the climate change solution. We know and expect that others will act responsibly, to make contributions that will improve our environment here in Nova Scotia and around the globe.

In late 1999, The Government of Nova Scotia asked Voluntary Planning to organize a series of public workshops around the province to seek input from Nova Scotians regarding principles and possible actions which could provide a framework for the provincial government's climate change strategy. A three-person panel representing members of Voluntary Planning and Clean Nova Scotia conducted the workshops in Amherst, New Glasgow, Sydney, Dartmouth, Bridgewater and Yarmouth. Aided by a workbook distributed in advance, approximately 150 people participated in the workshops. A document summarizing workshop discussions was prepared by Voluntary Planning and is available in hard copy or on-line (www.gov.ns.ca/natr/climate/index.htm).

What we heard from these consultations was that climate change is an issue that needs to be addressed by all Nova Scotians with leadership to come from the Government of Nova Scotia.

Nova Scotia's Climate Change Vision

Nova Scotians must look ahead and want to reap the benefits of a world that will become increasingly less dependent on carbon as everyone responds to the climate change challenge. We see others taking actions to use less carbon-intensive energy sources, increase energy efficiency, and encourage more climate-friendly business and personal activities. Moreover, we expect lifestyle and consumption patterns to change as society places greater priority on healthy living.

Based on what Nova Scotians told us in workshops and in written submissions, the following vision statement will guide the response of the Government of Nova Scotia to climate change:

> *Nova Scotia will take responsible action in response to climate change. Actions to protect and improve our health, environment and quality of life will be guided by sustainable development principles.*

Nova Scotia's Environment Act defines "sustainable development" as "development that meets the needs of the present generation without compromising the ability of the future generation to meet their own needs."

We know that it is not a challenge to be taken lightly. Many opportunities for reducing emissions are available to us that also deliver benefits in the areas of energy savings, health and the environment that outweigh the costs. We have identified a number of these opportunities and we will focus on them in the short term as we lay the groundwork for future action.

As uncertainty about the science of climate change and how the world will respond diminishes over the longer term, more far reaching and challenging action, involving more substantial changes in the ways we use energy and the energy sources we rely on, will be required. The cost of this action to government and the public may go beyond the short-term benefits of the investment.

Guiding Principles

The Government of Nova Scotia will take a leadership role with respect to helping Nova Scotians learn more about climate change and understanding potential impacts. It will encourage individuals, businesses, industry and communities to take early actions to reduce emissions and adapt to climate change. It will foster development of a strategic approach recognizing that as we become better informed about climate change, we will be able to make better decisions.

The following principles will guide Nova Scotia's climate change strategy:.

1. The strategy will support Nova Scotia's commitment to work with the federal government and other

provinces and territories to develop a national, coordinated response to climate change.

2. The strategy must be realistic, affordable and effective. Addressing climate change will cost money. Partnerships with other governments, industry and individuals can make our dollars go farther.
3. The strategy recognizes that both mitigation and adaptation measures are necessary.
4. Addressing climate change is a shared responsibility: there is a role for everyone.
5. Public education is vital to engage Nova Scotians in emission reduction, and is essential in implementing the strategy.
6. We need to better understand the science of climate change, the impacts on our province, and how to adapt to change. We also need more information about the impacts, costs and benefits of taking certain actions.
7. We will begin by taking "no regrets" actions and evaluate the results. We will begin by choosing actions where the benefits exceed the costs. In the longer term, we must be prepared to implement actions where costs will be higher.
8. There is no "one-size-fits-all" solution: the strategy will support a broad range of actions which take account of the unique and special characteristics of different communities and regions.

Early Actions on Climate Change

Climate change is a global phenomenon. At present, the nations of the world are debating appropriate goals and actions. The federal, provincial and territorial governments are still defining elements of a national climate change strategy under the Nova Scotia Climate Change Strategy Framework. The province will prepare and maintain an evolving three-year business plan, consistent with the time frame proposed by the National Implementation Strategy and the provincial budget cycle. Three-year plans allow for course correction changes based on science, education, technology and public priorities. Initial actions that will form the foundation of the province's first business plan are outlined below.

1. The Province will negotiate agreements with the federal government and other provinces to establish a framework for cooperative and coordinated action.
2. The province will launch a Government House-in-Order program to improve energy efficiency in its operations and set an example for energy efficiency improvements.
3. The province will support the creation of public education programs to prepare and present information and to support interaction on climate change with various stakeholders. This program will be a useful, cost-effective mechanism to support climate change initiatives.
4. The province will maintain a regulatory framework that will encourage the use of natural gas in Nova Scotia.
5. The province will work with the Union of Nova Scotia Municipalities to promote greater awareness leading to action aimed at reducing greenhouse gas emissions and adaptation to climate change in key areas such as buildings, transportation and land-use planning.
6. The province will promote development of innovative technologies and practices to increase energy

efficiency, generate clean energy, and reduce greenhouse gas emissions.

7. The province will make climate change a part of all government decision-making about energy projects, resource use, new business start-ups, and business expansion plans.
8. Nova Scotia will continue to work with the federal government, other provinces, and territories to establish a system that will offer business and industry assurance that actions taken now and in the near future to reduce emissions will receive credit should emission controls become mandatory at some future date.
9. The Nova Scotia government will encourage universities, community colleges, research institutions, non-governmental organizations and industry associations to identify and evaluate the impacts of climate change as well as investigate potential adaptation measures.

Climate, The Greenhouse Effect and Fossil Fuels

Climate is the average weather, including seasonal extremes and variations, either locally, regionally or across the globe. In any one location, weather can change very rapidly from day to day and from year to year, even within an unchanging climate. These changes involve shifts in, for example, temperatures, precipitation, winds and clouds. In contrast to weather, climate is generally influenced by slow changes in features like the ocean, the land, the orbit of the earth about the sun, and the energy output of the sun.

The Earth's ecosystems not only contain our genetic and species diversity but provide us with many goods and services such as food, fibre, medicine, energy, clean water and opportunities for tourism and recreation.

These ecosystems, so essential to human health and well being, are all sensitive to changes in climate. Changes in any one part of the earth's climate system, such as the atmosphere, will affect the entire system. Rapid changes in the amount of precipitation, temperature or wind or sun across days or seasons such as predicted by global climate change can threaten ecosystems and overwhelm their capacity to adapt.

Greenhouse gases form a "blanket" and trap heat close to the earth's surface, helping to create the climate we experience here on earth. Without this "blanket" scientists estimate the mean global temperature would be 30 degrees C cooler than it is at present.

Fossil fuels, used to generate electricity and power cars and trucks, are the single most important man-made source of greenhouse gases (GHG). Greenhouse gases include water vapour (H_20), carbon dioxide ($C0_2$), methane (CH_4), nitrous oxide (N_20), ozone (O_3) and halocarbons (PFCs, CFCs, etc.).

Scientists are worried about even greater increases in man-made, global GHG emissions as developing nations acquire new technology and strive to achieve lifestyles equivalent to those enjoyed in more developed regions. For its part, the developed world has been grappling with the challenge to reduce GHG emissions on a timely and responsible basis, but these nations have not yet been successful in stemming the tide of emissions growth.

Nova Scotia's emissions profile (1997 data) shows that power generation accounts for 37.5% of GHG emissions, transportation 30%, industrial activity 9.8%, residential 8%, commercial 4.5%, and other 10%. Total $C0_2$ emissions in 1990 were 19.4 million tonnes, the same level as in 1997, the last year for which figures are available. Forecasts indicate that this figure could rise to 21.2 million tonnes by 2010 if current energy consumption patterns continue.

Nova Scotia ranks sixth among provinces and territories for its emissions of carbon dioxide, with approximately 3.5 per cent of Canadian emissions. The province, however, has the third highest per capita greenhouse gas emissions in Canada. These statistics illustrate the challenge confronting Nova Scotia: on a national and global scale we produce a relatively small percentage of greenhouse gases, but taken on a per capita basis Nova Scotians rank closer to the top of the list.

Existing Initiatives and Successes

Nova Scotia does not lack innovative, positive action to address energy efficiency, production, and consumption issues at local and household levels. In part because a coordinating body is not yet in place, and partly because the media has yet to identify climate change as an important subject for continuous reporting and monitoring, many Nova Scotians have never heard about significant early-action projects. Participants in the Climate Change Workshops advocated sharing information about pilot projects and incorporating success stories into the provincial strategy.

As previously noted, the Government of Nova Scotia has participated in nine Climate Change Action Fund projects, including:

- Our Dynamic Climate (ACAP, Cape Breton)
- Climate Change 2000 (Clean Nova Scotia)
- Climate Change Action Pack (Scientists and Innovators in the Schools)
- Home Tune-Up Program (Clean Nova Scotia)
- Annapolis Atmosfarm Outreach Project (Clean Annapolis River Project)
- Halifax Transportation Options Program (Ecology Action Centre)
- Retrofitting for Climate Change (Annapolis Valley Homebuilders' Association)
- Light Better for Less! (Illuminating Engineering Society)
- Annapolis River Climate Change Action Program (Clean Annapolis River Project)

Other initiatives and projects include:

- The province's Waste Management Strategy has been instrumental in reducing methane emissions by banning organic waste from municipal landfill sites.
- The "Light Better for Less!" Program was initiated as a partnership between the Nova Scotia Department of Natural Resources, the Nova Scotia Department of the Environment, Nova Scotia Power Inc., the Illuminating Engineering Society of North America, and the EcoAction 2000 Program sponsored by Environment Canada. The program encourages businesses to use energy

efficient lighting systems and demonstrates that investments in energy-efficient lighting usually pay for themselves within a year and reduce greenhouse gas emissions immediately.

- Most climate-change pilot projects have been organized and conducted by industry organizations and the non-governmental sector. For example, the residential building sector has taken a leadership role with respect to designing, building and retrofitting energy-efficient homes that are healthy to live in (R-2000 Home Program). Home builders recognized that our climate and energy use patterns presented an opportunity for all to gain: homeowners by reducing energy consumption; builders by augmenting their trade with professional certification; the manufacturing industry by creating demand for new or existing products and the environment by reducing greenhouse gas emissions. The Nova Scotia Home Builders' Association estimates that 28% of all R-2000 homes built in Canada were built in this province. While it is acknowledged that building homes to R-2000 standards is expensive, the payback period is relatively short and the long-term savings are substantial.
- A pilot project in Bedford, undertaken with assistance from Natural Resources Canada, involved testing the capacity of domestic solar hot water systems. Preliminary findings indicate that solar systems have provided 33% of the hot water needs of participating residents.
- Since 1998, the private Morgan Falls Power Company (New Germany) has been generating hydroelectricity. By replacing heavy fuel oil or coal with hydro, this facility reduces carbon dioxide emissions in Nova Scotia by 4,000 tonnes annually.
- The Town of Amherst is experimenting with ground-source heat pumps to service the residential sector. Nearby in Springhill, geothermal power from mine water is being used to heat homes and commercial enterprises (supplying water for aquaculture). Springhill has been recognized as a Millennium Eco-Community and may be the only so-designated community that is successfully using a renewable energy resource.
- Earth energy is also being used effectively in several institutional settings. The federal Women's Correctional Centre in Truro is completely dependent on ground heat to supply its heating requirements, and is regarded as being the most efficient facility of its kind in Canada. The new high schools in Horton and Milford rely on extracting heat from the ground and using it to heat and cool the buildings.
- The Eco-Efficiency Centre in Burnside Industrial Park, Dartmouth, assists small- and medium-sized businesses improve their environmental performance, including the reduction of GHG emissions, while not adding to overall costs. The centre helps match companies in the park, where the waste product of one could become the raw material for another. The centre is operated as a partnership between the three levels of government, Nova Scotia Power, and Dalhousie University.
- Clean Nova Scotia is leading a major public education and awareness campaign aimed primarily at homeowners and consumers. In addition to producing easy-to-read educational materials about climate change, they piloted a successful Home Tune-Up program in Halifax Regional Municipality

which will involve up to 2000 home visits and follow-up reports. The team of environmental assessors looked at participating homes as inter-related systems (considering energy consumption, water consumption, solid waste management, and landscaping).

- Voluntary Challenge and Registry Inc. (VCR Inc.) is a not-for-profit corporation that helps public and private sector organizations limit their net greenhouse gas emissions on a voluntary basis. The mission of VCR is "to provide the means for promoting, assessing and recognizing the effectiveness of the voluntary approach in addressing climate change". Across Canada, about 900 companies and organizations have joined the VCR; there are 23 members in Nova Scotia:
- Acadia University
- Annapolis Valley Regional School Board
- Atlantic Shopping Centres
- Bowater Mersey Paper Company Limited
- Cape Breton and Central Nova Scotia Railway
- Government of Nova Scotia
- Halifax Regional Municipality
- Kerr Heating Products
- Kimberly-Clark Nova Scotia
- Maritime Paper Products Ltd.
- Morgan Falls Power Company
- Mount Saint Vincent University
- Northwoodcare Incorporated
- Nova Scotia Community College
- Nova Scotia Power Inc.
- Nova Scotia Textiles Limited
- Nova Ski Ltd. (Ski Martock)
- Nu-Air Ventilation Systems Inc.
- Queen Elizabeth II Health Sciences Centre (QE II)
- Saint Mary's University
- Stora Enso Port Hawkesbury
- Town of New Glasgow
- University College of Cape Breton

Part VI

Environment

2. Air Pollutants

Seizing the Opportunity

Volume 2

Nova Scotia's Energy Strategy

NOVA SCOTIA

Part VI Environment

Section 2. Air Pollutants

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Air Pollutants

Statement of Principle

Nova Scotia intends to respond to environmental concerns about air quality in the province by reducing air emissions of harmful pollutants that result from combustion of fossil fuel.

Clean air is a prerequisite for a healthy environment. In Nova Scotia, concerns about air quality have been prompted in recent years by high levels of acid rain and smog, reports of elevated levels of toxins such as mercury in lakes and aquatic life, and a growing awareness of the health, environmental, and economic damage caused by these air pollutants. Nova Scotians value the beauty and health of their environment. The energy strategy acknowledges the environmental impacts of the energy sector and the need to find ways to lessen them.

It is clearly not sufficient for Nova Scotians that the energy strategy merely acknowledge the environment, or take steps to protect it while the business of energy development is carried on: measures that result in a long-term improvement to our environment are expected. Implementation of the actions outlined in this section of the energy strategy will result in improvements to the air quality in the province and to ecosystems that are affected by air pollutants.

It has been estimated that about 80% of Nova Scotia's air pollution originates outside the provincial borders, principally in the industrial heartland of North America. We have a clear self-interest in demanding better environmental performance from those areas. Taking positive steps to ensure that we address our own environmental problems will not only improve our own air quality, but will also provide us with the moral authority to insist on these demands, and ultimately to see some of our air quality problems dealt with at their source.

Government Role and Responsibility

Government responsibility for regulation of air quality in Nova Scotia is shared between federal and provincial levels. The provincial Department of Environment and Labour has principal responsibility for regulation of matters affecting the environment through the Environment Act. This act provides the authority for such initiatives as ambient air quality standards, emissions caps, performance standards, and air quality agreements with other parties.

Environment Canada has the authority to declare substances toxic under the Environmental Protection Act, and thereby bring them under federal control. A declared toxic substance is subject to federal regulation, and Environment Canada can set standards that limit, for example, emissions to the atmosphere. The four air pollutants specifically targeted by the energy strategy—sulphur dioxide (SO_2), nitrogen oxides (NO_x), mercury, and fine particulates—have been declared toxic substances by Environment Canada.

Policy development and national liaison with respect to air issues is split between the Department of Environment and Labour, which deals with issues related to air pollutants, and the Department of Natural Resources, which is the lead provincial department on issues related to the national climate change process.

Because many environmental issues, especially those concerning air emissions, are linked, government must ensure that there is a coordinated approach among jurisdictions on environment issues. Meeting objectives for energy-related environmental improvement in Nova Scotia requires a high degree of cooperation and coordination between the federal and provincial governments.

Advances in technology can accelerate improvements and the development of cost-effective solutions to many environmental concerns. Directing environmentally focused research and development projects is an appropriate and essential role for government, and an area suited to private-public partnerships.

Strategy Objectives

- Reduce the emission of air pollutants from the generation and consumption of energy in a manner that is consistent with national standards.

2001-2005

- Reduce SO_2 emissions by 25% from current levels by 2005.
- Reduce Mercury (Hg) emissions by 30% below 1995 levels by 2005.
- Negotiate agreements with the federal government and other provinces to establish a framework for co-operative and co-ordinated action. Work with existing facilities to model, and where appropriate, monitor the effects of their emissions to ensure that emission-reduction initiatives are having the desired results.
- Continue to require all utility and industrial boilers to install low-NO_x burner technology during upgrades and natural capital stock turnover.

2006 and Beyond

- Further reduce SO_2 in the longer-term to achieve a cumulative reduction goal of 50% by 2010.
- Reduce NO_x emissions by 20% below 2000 levels by 2009.
- Assess the state of technology options for mercury removal, and introduce appropriate regulations for mercury emissions that comply with Canada-wide standards for mercury now under development, by 2010.
- Comply with Canada-wide Standards for Particulate Matter and Ozone by 2010.
- Continue to require all utility and industrial boilers to install low-NO_x burner technology during upgrades and natural capital stock turnover.

Background

Air quality issues and their effects result from both trans-boundary air pollution coming from upwind jurisdictions, and emissions sources within Nova Scotia, most of which are related to burning fossil fuel.

Nova Scotia is faced with various environmental issues related to air pollution. Acid rain has destroyed a significant percentage of salmon habitat in the province, while endangering many other rivers. It also impairs forest growth, reducing the sustainable yield of forestry-related industries. High levels of mercury in our aquatic ecosystems harm the development of wildlife near the top of the food chain. Nova Scotians experience particularly poor air quality when atmospheric conditions push volumes of pollutant-laden air originating in industrial North America eastward. Nova Scotia has a high rate of respiratory disease, such as asthma. Given the link between air pollution and respiratory symptoms, poor air quality can result in significant direct health care costs, as well as indirect costs, such as high rates of absenteeism and loss of quality of life.

The energy strategy targets four specific pollutants: sulphur dioxide (SO_2), nitrogen oxides (NO_x), mercury, and particulate matter. Measures taken to reduce these pollutants will also result in reductions in the emission of other harmful substances, including heavy metals and persistent organic pollutants.

Sulphur Dioxide

Burning fossil fuels releases SO_2 and NO_x, which, when combined with atmospheric water, form the acid precipitation that damages vegetation, soil, and water habitat. Eastern Canadian environments are particularly sensitive to damage from acid precipitation because the soils tend to be relatively thin and poorly buffered. Damage to water habitat can in turn have a severe negative impact on aquatic life.

SO_2 emissions in Nova Scotia, of which 81% come from burning coal for electricity generation, are higher per capita than in most provinces and all of the New England states. SO_2 emissions in Nova Scotia represent 6% of the Canadian total, while Nova Scotia has about 3% of the Canadian population.

The quantity of SO_2 emissions from burning coal is directly related to the amount of sulphur that occurs naturally in the coal. This concentration varies widely: for example, coal mined from the Prince mine in Cape Breton averages about 3.5% SO_2, whereas coal mined by Pioneer Coal Co. in Stellarton averages about 0.8%. Technological solutions are available to remove most of the sulphur from coal during or directly following burning (see Part V Coal for details).

Nova Scotia is party to a number of agreements covering SO_2 emissions. The province has a cap of 189,000 tonnes per year (tpy), of which 145,000 tpy are allocated to Nova Scotia Power Inc. (NSPI). Petroleum refining and industrial and institutional uses of heavy fuel account for most of the remainder.

In June 2000, Nova Scotia joined other provinces, territories, and the federal government in endorsing the *Canada-wide Acid Rain Strategy Post-2000*. The primary goal of the strategy is to ensure that sulphate deposition does not exceed critical threshold levels (i.e. the amount of sulphate that can be deposited on an area while maintaining 95% of the lakes in the area at or above pH 6). Modeling results have shown that emission reductions of between 25% and 50% throughout central and eastern North America should, depending on location, bring Nova Scotia below critical thresholds.

The *Canada-wide Acid Rain Strategy* calls for a number of actions, including pursuing additional emission-reduction commitments from the United States and establishing new SO_2 emission-reduction targets in eastern Canada. SO_2 emissions may be reduced by using proven downstream technologies, such as scrubbers or fluidized bed combustion, or by switching to fuels with reduced sulphur content.

Nova Scotia also addresses air issues through the Conference of New England Governors and Eastern Canadian Premiers. In 1998, the governors and premiers agreed to an Acid Rain Action Plan and at their July 2000 meeting agreed to urge both Canadian and U.S. federal jurisdictions to reduce SO_2 emissions to 50% below current commitments by 2010.

Nitrogen Oxides

Nitrogen oxides (NO_x) contribute to acid rain, and they react chemically, along with volatile organic compounds (VOC's), to create ground-level ozone, a major component of smog. Rising concentrations of ground-level ozone increase the rate of respiratory attacks and have been closely correlated with hospital admissions and increased mortality. They also damage vegetation and decrease the productivity of some crops. They may contribute to forest decline (defoliation, tree mortality, and impaired growth) in some parts of Canada.

NO_x are released to the atmosphere by the burning of fossil fuel, principally in motor vehicles, electricity generators, and industrial boilers. Of the 73,000 t of NO_x released in Nova Scotia annually, 86% comes from the burning of gasoline, diesel fuel, coal, and oil.

In 1998, the Conference of New England Governors and Eastern Canadian Premiers agreed to an Acid Rain Action Plan and at their July 2000 meeting, agreed to urge both Canadian and U.S. federal jurisdictions to reduce NO_x emissions to 20–30% below current commitments by 2007.

In an effort to counter smog, Canada and the United States developed in 2000 the final draft of an Ozone Annex to the Air Quality Agreement, calling for reductions in emissions of NO_x and VOC in 18 states and in southern Ontario and southern Quebec. Reductions achieved under the Ozone Annex will reduce trans-boundary NO_x effects in Nova Scotia.

Reducing sulphur in transportation fuels allows pollution-control equipment to work better and will reduce NO_x emissions from the transportation sector by as much as 50%. NO_x can be reduced from utility and industrial boilers through the use of proven technologies such as low-NO_x burners and selective catalytic reduction (SCR). Requirements to update to these technologies during major upgrades (for example, low-NO_x burners were installed during the recent upgrades to Tufts Cove) or normal capital stock turnover should be sufficient for Nova Scotia to meet NO_x reduction requirements.

Mercury

Mercury can be introduced to the atmosphere through burning of fossil fuels. In the natural environment mercury can be converted by biological processes to methyl mercury, a proven neurotoxin, and can become concentrated in the food chain by fish and birds, ultimately making its way into higher animals, including humans. It is of particular concern to Nova Scotia because some fish from some provincial aquatic systems contain levels of mercury above the recommended consumption level, and reproductive effects have been found in birds. Loons in Kejimikujik National Park have the highest blood levels of mercury in North America. Mercury in the Nova Scotia environment may originate from the atmosphere and/or from geological sources, and mercury dynamics in the environment are still not completely understood. Numerous studies have documented elevated levels of mercury in freshwater fish across the northeastern United States and Canada. In response to this problem, the Conference of New England Governors and Eastern Canadian Premiers agreed in 1998 to a Mercury Action Plan, the regional goal of which is the virtual elimination of mercury emissions. Interim targets under discussion are a 20% to 50% reduction by 2005 from coal-fired utility boilers, and a 60% to 90 % reduction by 2010, depending on the availability of control measures that are technologically and economically feasible.

The chief energy-related source of mercury in Nova Scotia is coal combustion. Mercury in widely varying concentrations is a natural constituent of coal. Coal-fired electricity generation in Nova Scotia and New Brunswick accounts for 44% of the total mercury emissions in Atlantic Canada. The environmental impact of mercury from this source is a function not only of mercury concentrations in the coal, but also of other chemical constituents of the coal (e.g. sulphur and chlorine), which may affect the speciation of mercury and, thereby, the ability to capture it before it is emitted to the atmosphere. Coal in the Cape Breton coalfield has a relatively high mercury content compared to bituminous coal worldwide. By using imported coal, NSPI can reduce utility emissions, as long as mercury concentration in the imported coal is sufficiently low and associated chemical constituents do not negatively affect the ability to remove mercury from the emissions, Significant further reductions will ultimately require the use of technological control measures. While technologies have been developed, they have not been consistently effective across coals of differing chemistry.

Particulate Matter

Particulate matter (PM) is a further source of air pollution. Respirable particulate matter, which is linked to significant health effects, is classified as PM_{10} (10 microns or smaller) and the more harmful $PM_{2.5}$ (2.5 microns or smaller). $PM_{2.5}$ can be either a primary pollutant (directly produced) or a secondary pollutant (formed in the atmosphere from other pollutants). In Nova Scotia the two main sources of primary $PM_{2.5}$ are road dust and residential wood combustion. In 1995, Nova Scotia produced 34,600 t of $PM_{2.5}$, approximately 44% of which came from the energy sector (wood heat, transportation, and electricity generation). Secondary $PM_{2.5}$ makes up more than half the total $PM_{2.5}$ in Eastern Canada. In Nova Scotia, it is mostly sulphate-based as a result of our dependence on high-sulphur fossil fuels. Controlling SO_2 emissions will significantly help reduce $PM_{2.5}$ in Nova Scotia.

Canada-wide Standards for Particulate Matter and Ozone were ratified in June 2000 by federal, provincial, and territorial governments (with the exception of Quebec). Meeting these ambient-air quality concentration targets for ground-level ozone and fine particulate matter by 2020 will require a wide range of emission-reduction actions by governments and will also result in significant reductions in SO_2 and NO_x. With the exception of trans-boundary ground-level ozone, $PM_{2.5}$, and perhaps some localized effects, Nova Scotia is already very close to complying with these standards.

Public Advice

Many submissions expressed concern about the impact of energy production and consumption, particularly electricity generation and transportation, on the environment generally and on air quality in particular. It was pointed out that air pollution can significantly affect Nova Scotia's quality of life (with respect to public health or the health of ecosystems, for example), which is one of the fundamental attractions of the province. Several respondents pointed out that if we expect other jurisdictions to reduce sources of pollution that affect Nova Scotia, our moral authority to make these demands must come from our own willingness to take action in our own jurisdiction. Several submissions expressed the opinion that the preferred approach to air pollution issues is a multi-pollutant reduction strategy that is harmonized with our neighbours and trading partners, and justified on the basis of sound science.

A number of respondents pointed out that it is hard for energy consumers to make environmentally sound decisions in the absence of clear price signals, and that incentives for pollution reduction must be built into energy pricing. Full-cost accounting for energy, including environmental and health costs, would encourage consumers to make choices that favour the reduction of air pollution.

Analysis

The Energy Strategy recommends emission reductions for SO_2, NO_x, and mercury, and the management of particulates, based on consideration of the following principles.

Principles

Effects-based Environmental Management

The ultimate goal of environmental management is to reduce, and eventually eliminate, the negative health and environmental effects of our activities. These effects have real costs to Nova Scotians, including increased health expenditures, cleanup and remediation costs, and a decrease in the value of economic sectors—such as fishing, forestry, and tourism—that depend on a healthy environment. Within the limits of the best available knowledge, our environmental management initiatives should be directed toward reducing negative health and environmental effects.

Nova Scotia's current ambient air quality regulations, the Canada-wide Standards for Particulate Matter and Ozone, and the critical-threshold basis of our acid rain commitments, reflect a desire for effects-based standards. However, there is also a need to consider airshed or facility-specific emissions performance, especially where the standard or threshold is exceeded, because of the need to manage pollutants from many different sources and the difficulty of carrying out an adequate effects-monitoring program. Best efforts, however, will always be made to ensure that airshed or facility reductions will be directed toward reducing effects.

Effects-based environmental management depends on having access to, and applying, the appropriate information. Close co-operation between government and industry will be necessary to ensure that all investments in emission reductions will be directed toward the reduction of negative effects.

Multi-pollutant Approach

It is well-recognized that many activities designed to control one pollutant can have an effect, either positive or negative, on the release of others. It is more efficient to deal with a suite of pollutants than one at a time, and wherever possible, emission reduction activities should take into account all pollutants of interest. Where pressing issues make it imperative to address one or more pollutants before others, efforts should be made to ensure that facilities have adequate options to deal with pollutants over the short term in a manner that will not negatively affect future actions on other pollutants.

Consistency with National and International Commitments

Nova Scotia must maintain environmental standards that are consistent with those of the federal government and of our trading partners.

Having designated the four pollutants specifically targeted by this strategy as toxic substances under the federal Environmental Protection Act, Environment Canada has the authority to make regulations regarding these substances in the environment. By actively reducing these pollutants, Nova Scotia demonstrates a commitment consistent with the high priority afforded them by federal authorities.

Many environmental issues, especially those related to air, have a strong trans-boundary component. Because of Nova Scotia's location downwind of many of North America's largest emission sources, it is important that Nova Scotia actively seek emission reductions from upwind jurisdictions. As well, the province has a desire to increase its participation in the energy export market, and it would like to maintain or increase exports in other sectors. Many potential trading partners require, or are considering, environmental performance standards as a prerequisite for participation in these markets.

Our effective participation in national and international initiatives seeking emission reductions, and in energy and other export markets, will require us to show a "clean hands" approach by meeting sound, science-based emission commitments comparable to those carried out or expected of upwind jurisdictions.

Allowing for Economic Growth

To allow for future economic expansion while protecting the environment and the health of its citizens, Nova Scotia must maintain a gap between actual emissions and emissions-cap commitments.

The carrying capacity of the environment or of an ecosystem depends on the total amount of a stressor. This places natural limits on the total amount of pollutants that may be released into the environment. New facilities, even if they operate using the best available technologies, will still produce some pollutants. It therefore becomes important for the province to maintain a "pollutant gap," between actual releases and the maximum allowable release that can be reconciled with the development of new facilities or the expansion of existing ones. Following the effects-based principle, this gap may be province-wide or limited to individual ecosystems or airsheds.

Fair Treatment for Facilities

Emission reductions must take into account the fact that different facilities have different opportunities for reductions, in terms of both the activities carried out in the facility and the age of the facility. For example, a new facility will generally have lower emissions than are possible in an older one of the same size and type, or it may not be possible to reduce process emissions in the same way as combustion emissions. As well, some facilities might already be doing a better job of managing emissions and should get appropriate credit when further emission reductions are being sought.

It is also important to make sure that any facilities that compete, either directly or indirectly, with facilities in other jurisdictions are allowed to compete fairly. All recommendations for emission reductions will take into account emission requirements of similar facilities in other jurisdictions or in other sectors.

Emission Reductions

The recommended emission reductions follow the principles enunciated above and are based on the current state of knowledge and existing political commitments with other jurisdictions, either through the Canadian Council of Ministers of the Environment (CCME) or the Conference of New England Governors and Eastern Canadian Premiers organizations.

Sulphur Dioxide

SO_2 emission reductions are needed primarily to curtail acid rain, but will also help meet the Canada-wide Standard for Fine Particulate Matter ($PM_{2.5}$). Nova Scotia will need SO_2 emission reductions of about 25% below the existing cap, combined with even greater reductions from upwind jurisdictions, to reach critical thresholds for acid deposition.

The recommended 25% reduction in the annual SO_2 cap for Nova Scotia Power Inc. (NSPI) by 2005, combined with current emission levels from other facilities, will result in overall provincial emission levels of about 25% below our current cap. This can be attained without significant capital investment through a combination of burning relatively low-sulphur imported coal, greater use of natural gas at Tufts Cove, and imposing a sulphur limit for heavy oil of 2%, or an acceptable equivalent, within one year of the release of the energy strategy. Note that current emissions are about 10% below the existing cap.

A further 25% reduction by 2010 of SO_2 from the existing facilities' total, including NSPI, can be achieved through greater penetration of natural gas into the industrial and utility sector, and the continued use of low-sulphur coal. If greater amounts of high-sulphur Cape Breton coal are to be included in the fuel mix, a technological solution (such as scrubbers) will be required to remove SO_2 from the Lingan generating plant emissions. Such technologies are well-developed and in common use. A potential difficulty with installing scrubbers in existing plants is that they result in increased emissions of CO_2, which could become an issue if national emission targets for greenhouse gasses are enacted.

Carrying out emission reductions commensurate with our share of the problem is necessary to meet critical thresholds for acid rain, and the air quality objectives provided for under our own regulations and the Canada-wide Standards. The reductions provide an emissions gap that (1) allows for new investment in Nova Scotia without compromising the environment, and (2) builds a cushion to ensure that the environment and the health of citizens is protected as our knowledge of the environmental and health effects of SO_2 increases.

Nitrogen Oxides

NO_x emission reductions are needed to curtail acid rain and to help meet the Canada-wide Standard for ozone, a major component of smog. While we know that NO_x reductions will be necessary, continued research is needed to strictly quantify the reduction level. In the meantime the province will seek reductions commensurate with the Conference of New England Governors and Eastern Canadian Premiers regional objective of 20–30% by 2007, and subject to future commitments to the Conference, the Canada-wide Acid Rain Strategy Post-2000, and Canada-wide Standards. A large portion of this reduction will come from the transportation sector as a result of new fuel regulations. This, combined with a 20% reduction in NSPI's emissions by 2009, is feasible and will allow us to carry out a fair contribution towards the Conference objectives.

A strategy to have all utility and industrial boilers install low-NO_x burner technology during upgrades and natural capital stock turnover will leave Nova Scotia in a good position to meet future commitments.

Mercury

Methyl mercury is a proven neurotoxin, even at very low levels, and the ultimate goal for mercury is virtual elimination of further additions of anthropogenic mercury to the environment. Because mercury is a natural constituent of coal, complete elimination is not feasible at this time. However, a realistic goal in the shorter term is to make reductions where technically and economically feasible. Nova Scotia has committed to contribute to the Conference of New England Governors and Eastern Canadian Premiers mercury reduction objectives from coal generation by 2005 of 20-50% from 1995 levels, and of 60-90% from 1995 levels by 2010, if technically and economically feasible control measures are available. A reduction of 30% by 2005 from NSPI is feasible. Given our small percentage of regional mercury emissions, and our success in reducing mercury releases in other sectors, this represents a fair contribution to the regional reduction targets.

The technological solutions for reducing mercury emissions are not well developed. Continuing research and development are expected to result in an improved ability to reduce mercury emissions from coal burning, and this should make further reductions feasible in the medium term.

Particulates

The CCME has already approved a Canada-wide Standard for Particulate Matter ($PM_{2.5}$), to be achieved by 2010. This is an ambient standard and will require emission reductions as needed to meet the standard. Current studies have shown that reductions of SO_2, combined with other initiatives such as national specifications for residential wood burning and other non-energy initiatives, should allow Nova Scotia to meet the Canada-wide Standard.

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Part VII

Energy Efficiency

1. Conservation and Efficiency

Seizing the
Opportunity
Volume 2

Nova Scotia's Energy Strategy

NOVA SCOTIA

Part VII Energy Efficiency

Section 1. Conservation and Efficiency

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Conservation and Efficiency

Statement of Principle

Increasing energy efficiency and energy conservation in all sectors will reduce total costs to Nova Scotia energy users and be consistent with the broader public policy goals of economic efficiency and environmental protection.

Increasing energy efficiency means using less energy to produce the same amount of light, heat, transportation, or other services. Using energy wisely and efficiently ensures that energy resources are not wasted, helps ensure that supplies are sufficient for our needs, provides what is essentially a new cost-effective source of supply, and reduces harmful air emissions.

Energy efficiency and conservation provide substantial benefits, including:

- reduced energy demand, thereby improving Nova Scotia's energy security;
- improved competitiveness of goods and services industries through decreased energy inputs and increased productivity;
- job creation in energy products and services sectors;
- reduced environmental impacts associated with the development, production, distribution, and use of energy; and
- moderation of energy prices by offering a competing source of energy to conventional supplies.

Energy efficiency and conservation result from actions across society, including industry and government. However, significant energy efficiency gains ultimately depend on consumers who choose energy efficient options. The energy strategy provides opportunities for government to lead by example, to send the right signal to industry and consumers in support of energy efficiency and conservation, and to encourage conservation and efficiency programs in the energy sector.

Government Role and Responsibility

The provincial government is responsible for the policy framework within which energy efficiency is managed, as well as programs and information services aimed at promoting energy efficiency. The province regulates the efficiency of appliances sold or leased in Nova Scotia through the *Energy Efficient Appliances Act*, which sets energy efficiency standards for locally produced appliances. Energy efficiency of appliances traded across provincial boundaries is controlled by the federal *Energy Efficiency Act*, which sets efficiency standards that must be met for a variety of energy-using products imported into Canada or transported across provincial boundaries.

Rate-based load management strategies such as time-of-use rates or other efficiency strategies managed by the utility require the approval of the Utilities and Review Board (UARB).

Strategy Objectives

- To provide mechanisms to encourage the conservation and more efficient use of Nova Scotia's energy resources.
- To increase public awareness of the importance and benefits of energy conservation and efficient energy use.

Actions to Achieve Objectives

2001-2005

- Lead by example with a government house-in-order program that has targets for energy use in existing government-funded facilities.
- Promote the use of energy service companies (ESCOs) as a means of achieving energy savings by large energy users, including government.
- Develop and maintain an inventory of energy use for all provincially owned or funded facilities and all fuel used in the provincial vehicle fleet.
- Continue to support energy efficiency in new housing, including the R-2000 Home Program and ENERhouse conference.
- Encourage energy efficiency in existing housing by supporting residential energy audits, expanded web-based energy information, publications, and advice to consumers.
- Work with the federal government and other partners to provide energy efficiency audits, information, and incentives to industry and small- to medium-sized businesses.
- Increase participation in the Voluntary Challenge and Registry through dissemination of information and assisting industry with requirements for participation.
- Require that all new government-funded buildings exceed the targets of the model National Energy Code for Buildings by 25%, so that facilities may qualify for the Commercial Building Incentive program (CBIP).
- Begin to phase in energy efficiency standards for commercial heating, ventilating, and air conditioning equipment in provincially funded buildings.

2006 and Beyond

- Continue implementation of government house-in-order programs and review and report on progress. Determine potential for expansion of the program beyond energy to include green buildings standards.
- Revisit energy standards (codes) and update as required in response to changes in energy prices, and in the cost of energy efficiency measures and technologies in new housing and buildings.
- Review industry action to improve energy efficiency and reduce greenhouse gas emissions through

Voluntary Challenge and Registry and other benchmarks, and revise voluntary initiatives as appropriate.

- Consider expansion of the government house-in-order program to facilities rented by government.
- Update energy efficiency standards for energy-using equipment.
- Encourage and support municipalities in their efforts to implement energy efficiency initiatives that address municipal energy use.
- Review progress by small and medium enterprises in implementing energy efficiency measures, and adjust services and programs as required.
- Update appliance and efficiency standards.

Links to Energy Strategy Themes

Increasing the efficiency with which energy is used increases the overall efficiency of our economy and provides incremental energy supply in a very cost-effective manner, thereby helping to **Power our Economy**.

Increased energy efficiency means that less energy is consumed to provide the same level of service. For electricity, this results in decreased impact of generation - particularly with respect to harmful air emissions - directly proportional to the magnitude of the efficiency gains, and thereby contributes to **Improving our Environment**.

Background

Energy efficiency and conservation reduce the demand for energy. In this way, they represent an alternative to finding new energy supplies, while reducing the environmental impacts of energy use. Energy efficiency is calculated by measuring the change in the amount of energy required to perform a given task or provide a given service. For example, EnerGuide for Houses ranks the energy efficiency of a house following an energy audit on a scale of one to 100 and provides a revised ranking based on implementation of a set of energy efficiency measures. Many appliances are rated in terms of the kilowatt-hours consumed in a typical year of operation.

Significant gains in energy efficiency have been made over the past 20 years in all economic sectors. Without these gains, energy use today would be much greater than it is. For example, Natural Resources Canada's Office of Energy Efficiency estimates savings of 430 petajoules of energy (or about 6% of 1998 consumption) from improved energy efficiency between 1990 and 1998. Experts estimate that there is considerable untapped potential for energy efficiency at current energy price levels.

Despite flat or declining energy prices in real terms in Nova Scotia between 1990 and 1997, real gains in energy efficiency have been achieved. Improvements were more significant in some sectors than in others. For example, residential demand per household fell 12.3% during this period, allowing total residential end-use demand to remain relatively constant despite a significant increase in the population and number of households. End-use demand per capita fell less slowly during the same period, recording only a 2% drop. End-use demand per dollar of real domestic product (RDP) also fell between 1990 and 1997, dropping 5.2%. This means that every dollar of economic output in 1997 required 5.2% less energy than in 1990.

Some sectors did not show significant improvements in energy efficiency during this time. In the transportation sector, for example, new-car energy use improved only marginally, dropping from 9.8 L/100 km to 9.6 L/100 km. The entire on-road vehicle stock improved more noticeably from an average of 10.5 L/100 km to 9.7 L/100 km over the same period, as newer models replaced older, less fuel-efficient ones.

As we look to the future, major gains are still expected in the residential sector, with energy use expected to decline another 3% between 1997 and 2010. Commercial sector energy use is expected to remain constant, while industrial energy use is expected to decline 3.5%. Transportation, on the other hand, is expected to see a growth in demand of 13.6% between 1997 and 2010 under a business-as-usual forecast.

Primary energy demand per dollar of RDP is expected to fall a further 21.5% between 1997 and 2010 as natural gas, with its higher efficiency, replaces refined petroleum products and, to a lesser extent, coal. Primary energy demand is expected to grow by 9%.

Core funding for energy efficiency and conservation has been primarily a government responsibility, with lesser participation (beginning in the 1990s) by electric and, later, gas utilities. The federal government offers a wide range of programs. Nova Scotia is an active partner in the delivery of a small number of these programs within our jurisdiction. For example, Nova Scotia formerly participated with the federal government through a series of energy cost-sharing agreements in a range of information and financial-incentive programs. The province currently participates with Natural Resources Canada in a reduced range of energy efficiency programs, including the R-2000 Home Program, residential energy audits, housing and energy conferences, and consumer outreach activities in the residential and transportation sectors. Government funding was highest in the 1980s and was still substantial in the early 1990s. Provincial funding for energy efficiency and conservation declined steadily during the 1990s.

Utilities offer a diminishing range of demand-side management programs, as their focus has shifted to market retention and growth in an increasingly restructured and competitive market for energy supplies. Utility programs have included support for low-flow showerheads, energy efficient water heaters and water heater wraps, energy efficient lighting, energy efficient motors, and other energy efficient products, as well as sponsorship of the R-2000 Home Program. Current utility programs include support for demonstration homes featuring various forms of electric heating, information on energy efficient products, energy audits for selected customers based on consumption, and support for conversion to more energy efficient heating sources such as heat pumps.

Recently the federal government and some provinces (Alberta and Quebec) have begun to increase budgets for energy efficiency and conservation, reversing a decade-long decline in government expenditures on energy efficiency and conservation. The Government of Canada encourages energy efficiency through the Natural Resources Canada Office of Energy Efficiency (OEE), which bills itself as Canada's one-stop service for energy efficiency. Through its many programs for the residential (EnerGuide for Equipment and HVAC; EnerGuide for Houses, R-2000 Program), commercial (Commercial Building Incentive Program), industrial (Industrial Energy Efficiency Program) and transportation (Auto$mart, Energuide for Vehicles, fleetSmart) sectors, the OEE attempts to help Canadians save energy and money.

A similar range of energy efficiency programs can be found in other federal jurisdictions. A particularly well known program, ENERGY STAR, was introduced by the U.S. Environmental Protection Agency in 1992 as a voluntary labelling program designed to identify and promote energy efficient products. ENERGY STAR, now partnered with the U.S. Department of Energy, has expanded to cover new homes, most of the buildings sector, residential heating and cooling equipment, major appliances, office equipment, lighting, consumer electronics, and more product areas.

Public Advice

Public response favoured energy efficiency and conservation as key components of the energy strategy, in order to help achieve environmental goals and reduce energy demand. A key message of many respondents was that real progress depends on a positive attitude toward conservation and efficiency, and a societal recognition of the connections between energy consumption, environmental impact, and cost. Many submissions suggested that government should take action with respect to energy efficiency by promoting policies and standards that remove barriers to energy efficiency, support technological innovation, and encourage increased investment and incentives to promote energy efficiency, demand-side management, and conservation.

There was little support for subsidization of energy efficiency initiatives, but many respondents suggested that government should make use of tax incentives or tax credits to encourage energy conservation and efficiency.

Analysis

Since the late 1970s governments have encouraged energy efficiency in response to concerns about the cost and security of energy supply. Nova Scotia has offered programs in support of energy efficiency since that time, including information and financial incentive programs directed at all economic sectors. For example, the province has provided industrial energy audits and financial support for engineering studies to identify and determine the cost of energy efficiency opportunities, financial support for demonstration projects in all sectors for energy efficiency and renewable energy technologies, and audits of government facilities. Nova Scotia has provided comprehensive information and education services to all sectors. As well, the province has routinely engaged in improving energy efficiency in government-funded buildings through energy performance contracting, assisting contractors to qualify buildings under the Commercial Buildings Incentive program, and selecting cost-effective energy efficiency alternatives through day-to-day maintenance and upgrading of government buildings.

Energy efficiency programs were reduced in the 1990s in a climate of stable energy prices and reduced concerns about security. Currently, only a reduced range of information services restricted to the residential and transportation sectors is provided. Energy efficiency and conservation are now being reviewed in light of concerns about global climate change and the role of fossil fuel consumption in producing greenhouse gas emissions.

Most experts agree that Nova Scotia and Canada have not yet reached the levels of energy efficiency of other industrialized countries. The potential for energy efficiency has been estimated for a number of sectors and end uses. For example, studies conducted for the Buildings Issue Table, established under the National Climate Change Process, indicate that the potential energy savings in existing houses is greater than 30%. The majority of newly constructed houses use 20% to 40% more energy for heating and water heating than R-2000 homes, a yardstick for energy efficiency in new house construction. The potential for improvement in existing commercial and institutional buildings has been estimated at 20% of current energy use.

Many of the barriers to energy efficiency have changed little in the past decade: lack of access to information on energy efficiency choices, the lack of availability or high cost of energy efficient products, price signals that do not adequately reflect the real cost of energy to consumers, the lack of capital to undertake energy efficiency projects, and a general lack of concern about the security of energy supplies and the impact of energy use on the environment.

Energy service companies (ESCOs) have been instrumental in helping large energy users achieve major gains in energy efficiency and conservation. These companies identify energy savings opportunities, implement them on behalf of an energy user (e.g. the building owner), and are paid back from the energy savings. The use of ESCOs overcomes two key barriers to energy efficiency: the user's lack of information or technical capability to implement measures, and the lack of capital to finance needed retrofits.

Some governments have taken a more active role in managing energy use in their own operations, with some success. The federal government has achieved a 19% reduction in greenhouse gas (GHG) emissions since 1990 through building retrofits, better fleet management, downsizing of operations, and green-power purchases. It is forecasting an additional 12% improvement between now and 2010. Closer to home, the New Brunswick government carried out a Provincial Buildings Initiative during the 1990s to improve the energy efficiency of its owned facilities. These improvements have resulted in an average 20% energy savings in participating buildings, which is consistent with savings achieved by similar initiatives in other jurisdictions.

Energy Efficiency in Government Operations

When governments lead by example in improving energy efficiency, it encourages others to do the same. The *Government of Canada Action Plan 2000 on Climate Change* established a goal of a 31% reduction in GHG emissions from government operations by 2010, to be achieved largely through energy efficiency. A 19% reduction has already been achieved. The 2001 U.S. national energy plan, *Reliable, Affordable and Environmentally Sound Energy Future for America's Future*, reported a 30% reduction in energy use in government buildings since 1990, largely as a result of energy efficiency.

Substantial government funding has been available in the past for energy efficiency programs, but investment has been steadily declining in Nova Scotia through the 1990s, resulting in decreases in in-house research and information tracking, and also in delivery of information programs and energy audit services in all sectors. Perhaps more significantly, the current lack of provincial funding for energy efficiency programs compromises our ability to take advantage of money in federal programs that require provincial partnering, such as those outlined in the federal *Action Plan 2000*. Nonetheless, the Nova Scotia government continues to use existing budgets, where it is possible and cost effective, to fund energy efficiency projects in conjunction with other projects.

Partnerships provide the most cost-effective use of government money in this area. A variety of opportunities include partnering with the federal government to ensure that benefits of federal programs are available in Nova Scotia, and partnering with others (private sector, non-governmental organizations) in delivery of programs in Nova Scotia. Beyond this, the provincial government may be required to deliver some programs that fill gaps or complement federal and other initiatives.

Buildings account for a significant share of government emissions and present good opportunities for low-cost reductions. New Brunswick, Alberta, Quebec, and Ontario have aggressively pursued energy reductions in government buildings, routinely achieving reductions in the 25% range over short time frames. New Brunswick has targeted a 20% reduction in energy use from 1995 levels in government-funded buildings.

During the past three years computer models have been used to select cost-effective options for achieving energy efficiency in new government-funded facilities, particularly schools. Based on this analysis, designs calling for 25% less energy use than specified in the model National Energy Code for Buildings have been selected in government-funded buildings ranging from schools to secure treatment facilities. Nova Scotia's Department of Transportation and Public Works has completed energy audits of 10 government facilities to identify opportunities to improve energy efficiency. It expects savings of 20% to 30% by taking advantage of all opportunities. Previous energy retrofits at the Public Archives of Nova Scotia and the Maritime Museum of the Atlantic have yielded energy savings of 40% and 30%, respectively.

Energy Efficiency Programs

New Housing

Nova Scotia has become a leader in the field of energy efficient new housing in Canada. It has one of the most active R-2000 Home Programs in the country, with significant builder participation and training. R-2000 houses account for about 5% of single-family house starts in the province. More than 300 builders have been trained through the Nova Scotia R-2000 Home Program, giving R-2000 a large influence on standards for new house construction. The R-2000 Home Program has been in operation for almost 20 years, with provincial participation for the last 15. The province makes an annual contribution to the program and supports specific marketing initiatives such as the R-2000 Showcase of Homes. The major funding partner is the federal government, with contributions from manufacturers, suppliers, builders, and land developers.

Existing Housing

During the past two years, there has been an increase in energy efficiency audits of existing houses. Clean Nova Scotia performed energy audits for a fee on more than 1,000 units as part of a federal-provincial project and various private contractors have performed more than 400 EnerGuide for Houses home energy audits under a variety of initiatives.

Commercial, Institutional, and Industrial Sectors

The commercial and institutional sectors continue to experience growth in energy use and have not responded to energy efficiency initiatives as positively as the residential sector. Significant gains are possible, however, as shown by the success of some programs such as Light Better for Less, a partnership project between the utility, lighting industry, and government. Reductions in energy use of 300% have been achieved in a number of pilot lighting retrofits.

Voluntary initiatives represent a broad range of actions to influence, shape, and benchmark energy performance. The national Voluntary Challenge and Registry program (VCR; EcoGESTE in Quebec), supported by all provinces and the federal government, has been established to record and document participation, action plans, and best practices in the areas of energy efficiency and climate change.

More than 750 organizations have registered action plans with the VCR, including electric utilities, oil and gas companies, and other large industrial, institutional, and government energy users. The VCR has proven to be an effective vehicle for achieving and recording voluntary efforts to reduce energy use and greenhouse gas emissions. The registry contains numerous examples of successful efforts to reduce energy use. For example, DaimlerChrysler Canada was able to reduce energy use per vehicle produced by 42.2% between 1990 and 1999.

Energy Codes

New buildings represent a unique opportunity to improve energy efficiency. Decisions made at the time of construction will affect energy use of a building for 30 years or more. Many provinces, including Quebec, Ontario, Manitoba, and British Columbia, have incorporated standards for energy efficiency in their building codes. Ontario and parts of British Columbia have adopted the model National Energy Code for Buildings. Codes establish minimum requirements that serve to eliminate the most inefficient practices on the market, while still allowing market-leading technologies such as R-2000 to achieve further gains. Cost requirements for the building are largely based on lowest life cost (lowest cost over the life of the building) and generally result in modest increases in initial cost and long-term decreases in operating cost. Objections to energy codes have focused on the increased regulatory burden for builders and developers, and the increased level of required inspection.

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Part VII

Energy Efficiency

2. Transportation

Seizing the Opportunity

Volume 2

Nova Scotia's Energy Strategy

NOVA SCOTIA

Part VII Energy Efficiency

Section 2. Transportation

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Transportation

Statement of Principle

The transportation sector in Nova Scotia will improve its energy efficiency and reduce emissions of air contaminant and greenhouse gas emissions at a pace that reflects its integral role in the province's economic and social development.

A safe and efficient transportation system is critical to Nova Scotia's competitiveness, trade and tourism, and plays a key role in the quality of the lives of Nova Scotians. Our transportation infrastructure must meet the demands of (1) local users who reside in concentrated urban areas, towns and villages, and sparsely settled rural areas, and (2) inter-provincial transportation users. The importance of the smooth and economic functioning of our transportation sector should not be underestimated.

The transportation sector is the single largest energy end-user, accounting for about 43% of energy consumed in Nova Scotia (1999). As such, the transportation sector has a significant impact on the environment. Transportation is responsible for about 75% of Nova Scotia's greenhouse gas emissions, the bulk of which (72%) are contributed by cars and light trucks, and for a variety of air pollutants such as SO_2 and NO_x, which contribute to air quality problems including smog. An effective plan to reduce these emissions must look to a significant contribution from the transportation sector.

Government Role and Responsibility

The provincial government has responsibility for a wide range of matters concerning transportation. It develops, maintains, and regulates the use of 23,000 km of provincial highways. Municipal roads and highways are the responsibility of the municipalities. The province regulates all aspects of transportation safety (though not municipal transit, which is a municipal responsibility), vehicle operations, and operator licensing. It also operates a large fleet of provincial vehicles.

The province implements provincial interests in transportation planning and systems through statements of provincial interest, which are reflected in municipal land-use decisions. The provincial government manages public information and education programs aimed at reducing energy consumption and emissions by the transportation sector, and it supports partnerships that invest in initiatives to support energy efficiency in the transportation sector.

The Government of Canada sets national standards for fuel efficiency in motor vehicles and is responsible for interprovincial and international transportation matters.

Strategy Objectives

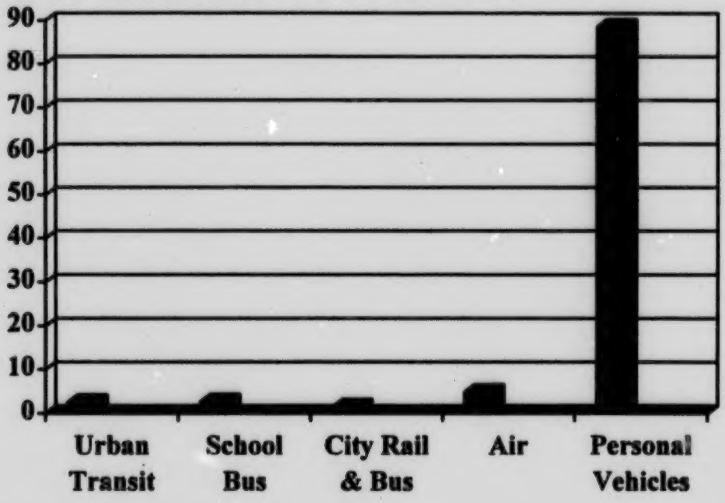
- To increase energy efficiency in the Nova Scotia transportation sector and improve air quality by decreasing harmful air emissions.
- To raise public awareness of the importance of energy efficiency in the transportation sector.

Actions to Achieve Objectives

2001–2005

- Maintain existing partnerships and develop new partnerships, particularly in the context of existing federal, provincial, and municipal policies and programs, to encourage energy efficiency in the transportation sector.
- Develop pilot projects in conjunction with non-profit agencies, the private sector, and municipalities to encourage more efficient transportation systems within their jurisdictions.
- Support initiatives in the multi-modal transportation strategy *The Way Ahead*, that encourage energy efficient transportation modes.
- Participate with the federal government and other provincial governments in joint programs aimed at improving energy efficiency in the transportation sector.
- Ensure that regulations and policies developed and implemented by the province recognize and reflect the need for energy efficiency in the transportation sector.
- Develop a provincial transportation statement of interest for inclusion in the Municipal Act, that provides for the incorporation of transportation efficiency in land-use planning. Work with municipalities to coordinate provincial transportation infrastructure decisions with municipal plans.
- Provide public awareness and education on the importance of energy conservation and emission reductions in the transportation sector.

Figure 1: Motorized Mode of Travel in Canada, 1995.



Source: STM vol. 1, pt. 4 March 1998.

Factors for a Change in Policy or Tactics

- When new technologies emerge that offer economic and energy efficient modes of transportation, the province will take a leadership role in considering early adoption of such technologies.

Links to Energy Strategy Themes

Increasing transportation efficiency will save energy and reduce harmful air emissions, thereby **Improving Our Environment.** By reducing wasteful practices, transportation efficiency redirects resources into more productive areas and contributes to energy supply, thereby **Securing Our Future.**

Background

Role of Transportation

Transportation, the movement of people and goods by air, sea or land, is critical to our economy, future economic growth, and our social well-being. The movement of people accounts for 58% of the energy used for transport in Canada while freight accounts for 42%. However, while the energy used for the movement of people has remained relatively constant, energy used to move road freight has more than doubled since 1979.

Transportation is the largest end-user of energy in our society, consuming 43% of Nova Scotia's total end-use energy demand in 1999. It is the largest direct contributor to greenhouse gas (GHG) emissions in Canada (about 25%; with its indirect contribution through vehicle manufacture, fuel production, etc., transportation's GHG total could be nearly 40%) and a significant contributor of SO_2 and NO_x, which contribute to smog and other air quality problems.

Energy use for transport has been growing at a higher rate than energy use for all other purposes. By far the largest users of energy in the transportation sector are cars and light trucks (86.6% of motorized vehicle travel in Canada; Figure 1). Almost all motorized transport uses non-renewable oil as fuel, and with the possible exception of rail this seems unlikely to change significantly in the near term. In the longer term there are possibilities for natural gas, fuel cells, ethanol, and other fuels to make significant inroads.

Modes of transportation differ not only in capacity to carry people and goods but also in consumption of energy and impact on the environment. However, for all motorized transportation modes, environmental effect is directly proportionate to fuel consumption.

As pointed out in one submission to the energy strategy, automobiles and aircraft are the most energy intensive means of passenger travel, substantially more so than trains or buses. Nonetheless, roads and air account for more than 90% of passenger travel in the country. Likewise, marine transport is the most energy efficient means of shipping goods, and trains are five times more energy efficient than trucks. Nonetheless, in Atlantic Canada 79% of freight is shipped by truck, 20% by train, and 1% by ship.

Transportation in Nova Scotia

Transportation affects every sector of the Nova Scotia economy, involving thousands of large and small companies. Our local industries depend on transportation to move their goods to market; local consumers depend on the transportation sector to supply their needs; and because of its strategic location, Nova Scotia acts as a port of preference for huge volumes of goods passing to and from the industrial and population heartlands of central Canada.

Nova Scotians also depend on transportation as a significant element in their quality of life. Many live in widely dispersed rural communities, where ability to travel is essential for work, school, health care, shopping, and socialization. Others are part of an increasingly urban provincial population where transportation problems endemic to many North American population centres are rapidly becoming issues: increased travel needs related to suburban developments, traffic congestion on arterial routes and in increasingly crowded downtown cores, challenges to maintaining and updating public transit, and air quality deterioration related to the concentration of vehicles.

Transportation demand projections for the period 1998 to 2007 indicate an increase in overall cargo of 37%, an increase in total arriving and departing air passengers of 20%, and an increase in total vehicle population of 27%. However, such projections do not take into account any massive social shifts such as the ones that followed the attacks on the United States on September 11, 2001. In the immediately following period, air traffic suffered a sharp decline and other modes of transportation rose. It is uncertain if this represents a long-term shift in transportation choice.

Provincial Initiatives

The Department of Transportation and Public Works (DPTW) has been working with others on transportation issues. It is exploring intelligent transportation systems (ITS) with other Atlantic provinces and will work with rail authorities on drafting a new Railway Act. DPTW has participated in transportation planning with groups such as Voluntary Planning , the Metropolitan Halifax Chamber of Commerce, and the Halifax Regional Municipality (HRM). Province-wide transportation issues were reviewed in the 1999 Voluntary Planning multi-modal transportation strategy *The Way Ahead,* which laid out a strategic framework for coordinating transportation in the province, including the following key directions.

- Promote and facilitate the development of transportation gateways, hubs, and corridors to enhance Nova Scotia's trade access and prominence.
- Stimulate regional development by levering multi-modal opportunities and making strategic infrastructure investments.
- Ensure a regulatory philosophy that protects the public interest and safeguards the competitive position of the transportation industry.

The 2000 provincial economic growth strategy *Opportunities for Prosperity* identified high-priority actions related to highways, ports, harbours and airports designed to provide for an adequate transportation infrastructure for economic growth.

Urban Transportation

Transportation continues to be an important issue in urban areas of Nova Scotia, and particularly HRM. Issues mainly revolve around the increasing difficulty and expense of moving people and goods into and out of the city. Integrated planning for future transportation requirements is a key requirement. A number of municipalities including HRM, Cape Breton Regional Municipality (CBRM), and Kings County support transit systems and have included transportation issues in their municipal planning exercises.

In October 2000, the Metropolitan Halifax Chamber of Commerce produced a Strategic Road Transportation Plan and called for a joint transportation group to be formed to address transportation deficiencies within and around Halifax.

HRM has undertaken a significant planning exercise to develop an integrated transportation/mobility strategy as part of its regional plan. The strategy will address issues related to road improvements, transit service enhancement, ferries, and transportation demand management initiatives to meet the long-term challenge of moving goods and people in a cost-efficient and environmentally sustainable manner. Current plans call for discussion papers to be completed in early 2002 with a consultation process to follow. In September 2000, HRM completed an Interim Regional Transportation Strategy. Implementation of this strategy has been put on hold pending initiation of regional planning, and will be reviewed by the Transportation/Mobility Task Force of the Regional Planning Project.

Public Advice

Comments related to transportation revealed a concern about the extent of energy use in this sector, although some were careful to point out the importance of the sector to competitiveness, trade, and tourism. Suggestions for improvements concentrated on three areas: conservation and efficiency, urban congestion, and government leadership.

Some specific suggestions included supporting active modes of transportation such as bicycles and walking; promoting vehicle efficiency, alternative fuels, car pooling, and telecommuting; and increasing transit choices. In addressing urban congestion, submissions pointed to the connection between energy-use policy and land-use policy, and called for comprehensive municipal planning to ensure that future development considers transportation needs and availability. Emphasis was placed on better use of existing infrastructure and better coordination among federal, provincial, and municipal levels of government. Many called for the provincial government to set an example in building partnerships and demonstrating conservation and efficiency.

Analysis

Overview

The potential for efficiency improvements in the transportation sector has been recognized for years;

many programs and initiatives have been put forward in Canada and elsewhere to take advantage of opportunities, with varying degrees of success. The challenge is that many options for improving the efficiency of transportation energy use are subject to public choice (e.g. size and fuel efficiency of vehicles, use of public transport), or they require significant financial investment or lifestyle disruptions (e.g. construction of bicycle lanes, new urban fast transit, walking). Clearly, taking advantage of such opportunities requires substantial public support and, in some cases, fundamental shifts in consumer attitudes and actions—never an easy task. Therefore, continuing public awareness and education programs are required to achieve efficiency in the transportation sector.

Potential Areas for Improvement in Transportation Energy Efficiency

Policy makers in Nova Scotia, Canada, and around the world have previously focused on challenges posed by the energy intensity of the transportation sector, and over the years various programs have been proposed as solutions. As pointed out in submissions to the Transportation Mobility Task Force, many of the solutions lie in areas that have been well defined already, and some of them are outside provincial jurisdiction. Many require significant funding to plan and implement.

Models for Success

There have been significant successes in achieving energy efficiency goals, particularly when partnerships have formed to solve problems. Perhaps the best recent example is the JUPITER (Joint Urban Project in Transport Energy Reduction) project, which has been piloting solutions to urban transportation problems in several diverse European cities. Demonstration projects include improving public transport systems, traffic management and control, parking policies, and promotion of public transport.

This successful project has resulted in significant improvements in traffic conditions, public transport, and reducing private vehicle use; it is now entering a second phase focusing on vehicles and alternative fuels, optimization of urban transport infrastructure, and city planning. Urban populations in North American cities should examine projects like this, as the results and conclusions could have wide applicability in areas like HRM where transportation issues continue to grow.

Need for Partnerships

The energy strategy recognizes that changes in the transportation sector are necessary to deal with both energy use and environmental impact. It also recognizes that the provincial government is unlikely to be able to make these changes alone. There are already some clearly defined areas in which partnerships might be beneficial.

Federal Role

At the federal level, actions have been proposed as part of the *Government of Canada Action Plan 2000 on Climate Change* to reduce greenhouse gas (GHG) emissions in the transportation sector. The stated priorities are:

- fuel efficiency targets for vehicles,
- new, low-emission fuels such as ethanol,
- fuel cells,
- efficiencies and technologies in aviation, rail, marine and trucking industries, and
- best urban transportation technologies and strategies to reduce GHG emissions.

The federal government has signalled its intention to work with the provinces and other partners in pursuit of these priorities. The Nova Scotia government will monitor these opportunities and, to the extent that resources allow, participate in areas that have the potential to address the needs of Nova Scotians.

Provincial Role

In a provincial context, many of the strategic actions in the multi-modal transportation strategy *The Way Ahead* specifically address priorities that contribute to energy efficiency. These actions include improvements to interprovincial rail service, identification and improvement of infrastructure in transportation corridors, improvement of links among different transportation modes to make them more efficient, and improvement of intra-provincial passenger services. These could all potentially lead to increased overall efficiency in the transportation system. Provincial priorities have been signalled in the economic growth strategy *Opportunities for Prosperity*. The province will continue to support and seek opportunities to move forward on these actions.

The province recognizes that provincial decisions on provincial highway construction can impact municipal plans for land use and traffic flow. Increased access to urban areas by high-speed highways provides important opportunities for the increased flow of goods and people into and out of cities. However, new infrastructure is costly and increases vehicular traffic in the urban areas, with attendant increased fuel use, air emissions, congestion, and inefficient energy use by commuters. The province will continue to work with urban municipalities to coordinate the long-range needs of the provincial transportation infrastructure with those of municipal planning.

Municipal Role

At the municipal level, significant efforts are presently underway to plan for future transportation needs. Considerations include ways in which urban congestion can be decreased, suburban populations can be better served by regional transportation systems, goods and people can be moved in and out of the city more efficiently, and environmental quality can be improved. The province is encouraged by these efforts and supports them. Although the province does not have the resources to provide significant fiscal support to large-scale reworking of municipal transportation infrastructures, it will seek ways to work with the municipalities and other interested parties to find ways to meet their transportation needs.

Public Role

Many of the solutions to improving transportation efficiency lie at the level of individual actions. Some involve personal decisions about lifestyle (choosing, for example, bicycles when possible, public transportation where available, and fuel-efficient vehicles).

Other solutions require a collective decision to make changes in favour of better energy efficiency (e.g. encouraging bicycles, buses, or car pools by allocating roadway lanes to them at the expense of one-passenger cars; changing patterns of vehicle use, parking, etc. in the downtown core). Decisions of this sort require a public commitment to change, which can only come about through increased public awareness of the issues. One focus of the energy strategy, therefore, is a continued commitment to increasing public awareness of the importance of increasing energy efficiency in transportation.

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Part VIII

Aboriginals and the Energy Sector

Seizing the Opportunity

Volume 2

Nova Scotia's Energy Strategy

NOVA SCOTIA

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Aboriginals and the Energy Sector

Statement of Principle

The government of Nova Scotia wishes to strengthen the participation and inclusion of Nova Scotia Mi'kmaq in the development and benefits of Nova Scotia's energy resources.

Nova Scotia's energy strategy is designed to promote economic growth, protect and enhance the environment, and support social well-being. These benefits are intended to provide advantages to all Nova Scotians. The strategy recognizes that energy resource development can have an impact on the Mi'kmaq of Nova Scotia, but it is also clear that this development creates an opportunity for Mi'kmaq to build greater self-reliance through direct participation in energy resource development.

Governments and the Mi'kmaq have to work together through negotiation to ease the uncertainty surrounding treaty rights and related issues. They have to make sure that development takes place in a socially responsible manner, respecting rights and protecting a key aspect of Nova Scotia's culture and history. Governments, Mi'kmaq, and the private sector have to work together to ensure that the Mi'kmaq of Nova Scotia are able to take advantage of the tremendous economic opportunity made available through energy resource development.

Government Role and Responsibility

Both federal and provincial governments must work in collaboration with Mi'kmaq to bring resolution to outstanding treaty issues. A clearer understanding of mutual rights and obligations will provide a foundation for planning, investment, and development, and it will reduce uncertainty for investors in the industrial sectors. Where existing rights are infringed there is a duty to ensure that Mi'kmaq are appropriately consulted.

The Nova Scotia and federal governments, in cooperation with the private sector , have a role to play in helping First Nations enhance their capacity to participate in resource development, including the energy sector. The private sector plays a key role in providing opportunities for Mi'kmaq to build capacity and participate in resource development.

The federal government has the specific constitutional responsibility for aboriginal people in Canada and, therefore, has an important role to play in strengthening the economic capacity of First Nations in Nova Scotia. The federal government has jurisdiction for development activity on Indian reserve lands.

Strategy Objectives

- To increase economic opportunities in the energy sector for Nova Scotia Mi'kmaq employment and/ or joint venture opportunities.
- To protect Mi'kmaq historical and cultural artifacts during energy developments.

- To ease uncertainty with respect to treaty rights and related issues through negotiated solutions.
- To hold appropriate and timely consultation between Governments and Nova Scotia Mi'kmaq on matters that infringe treaty rights.

Actions to Achieve Strategy Objectives

2001-2005

- Provide opportunities for the views and interests of all stakeholders, including those involved in the energy sector, to be taken into account during the process of addressing treaty rights and related issues with Nova Scotia Mi'kmaq.
- Work with Mi'kmaq organizations and the private sector to identify appropriate opportunities for greater Mi'kmaq participation in the energy sector.
- Work collaboratively with Nova Scotia Mi'kmaq and the Government of Canada to ensure that appropriate training and education opportunities are available to enable Mi'kmaq to take advantage of employment and business opportunities in the energy sector.
- Ensure that appropriate steps are taken to protect cultural artifacts and items of historical importance during energy development.

Links to Energy Strategy Themes

The inclusion and participation of Nova Scotia Mi'kmaq in energy resource development will provide a stronger, more diverse foundation for economic progress and will contribute to greater certainty for the industry, thereby contributing to **Powering our Economy**. An inclusive approach to increasing Nova Scotia's human capacity will enhance our citizens' ability to be productive and self-sufficient, and will provide widespread social benefits. Strengthening our society is a vital prerequisite to **Securing Our Future**.

Background

> "[T]here is opportunity for Aboriginal peoples to pursue individual and community goals of self-sufficiency, inclusion, pride, and prosperity through participation in the economy."[1]

Nova Scotia joins the other provinces, territories, and the federal government in seeking ways to facilitate aboriginal participation in the economy. These efforts are founded on the principles of collaboration, recognition of diversity, and equality of opportunity.

There is much to be done to foster an environment that is more supportive of aboriginal contributions to the economy.

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[1] Report of the Working Group on Aboriginal Participation in the Economy, May 11, 2001. *Strengthening Aboriginal Participation in the Economy*, p. 13. http://www.gov.ns.ca/abor/pubs/FPTA.pdf

According to the 1996 Canadian census, the Status Indian population numbered 12,380 in Nova Scotia. This represented 1.4% of the province's total population of 899,970 (Statistics Canada, Quarterly Population Estimates). In Canada, the aboriginal population is younger than the average population. The working-age population of aboriginal people is expected to grow at three to five times the rate of its non-aboriginal counterpart. The census also shows that aboriginal people on average lag behind the non-aboriginal population in levels of schooling and income.

The Mi'kmaq are interested in building capacity through training, education, and meaningful employment opportunities without compromising traditional values. There is also an interest in the protection of traditional use of lands from development.

Clearly, there is untapped economic potential in Nova Scotia's and Canada's aboriginal communities. Through collaborative efforts, governments, Mi'kmaq, and the private sector can strengthen the capacity of these communities so that they are able to take better advantage of the opportunities that will present themselves in the energy sector. This will have long-term, positive impacts for all Nova Scotians.

Public Advice

Significant interests that came up during discussions about Mi'kmaq interests include the potential for joint economic ventures and the need for timely, appropriate training to support increased employment in the energy resource sectors. The need to address treaty rights and related issues with the federal and provincial governments is reflected in all discussions about the interests of Mi'kmaq and the development of energy resources.

Analysis

Resolving Treaty and Related Issues

The Government of Nova Scotia is in the initial stages of negotiating treaty rights and related issues, including land and resource issues, with the federal government and Nova Scotia Mi'kmaq. This multi-stage process will examine a range of opportunities to resolve outstanding issues between governments and First Nations in Nova Scotia. By easing the current level of uncertainty with respect to aboriginal and treaty rights, Nova Scotia has an opportunity to improve the business climate.

Nova Scotia holds the position that these outstanding issues can be resolved through negotiation. The Nova Scotia Office of Aboriginal Affairs has conducted discussions with the federal government and Nova Scotia Mi'kmaq, as represented by the Assembly of Chiefs, to develop a process by which questions of treaty rights and related issues can be dealt with.

The Government of Nova Scotia has publicly declared an interest in resolving outstanding issues through negotiated settlement, as the most effective way to achieve fairness for all Nova Scotians. As this process unfolds, it will be critical that the views and interests of all stakeholders, including those involved in the energy sector, are taken into account.

Nova Scotia Benefits from Energy Development

Mi'kmaq communities should share with other Nova Scotians in the economic benefits of energy development. To this end, the province encourages activities that promote Mi'kmaq employment and participation in the energy sector. Such action is consistent with both the provincial economic growth strategy and recent work conducted at a national level by ministers responsible for aboriginal matters and leaders of the five national aboriginal organizations.

In December 1999, ministers and national aboriginals leaders, through the Federal-Provincial/Territorial-Aboriginal (FPTA) Forum agreed on the importance of strengthening aboriginal involvement in the economy. Its paper on aboriginal participation in the economy highlights the critical role the private sector can play, and efforts are underway in all parts of Canada to strengthen and coordinate efforts (Strengthening, 2001).

It makes good business sense for the private sector to identify appropriate opportunities for Mi'kmaq participation in the energy sector, and to engage in partnerships with Nova Scotia Mi'kmaq. The aboriginal population tends to be younger and faster growing than other segments of Nova Scotia's population. As the general workforce ages, this untapped potential can play a significant role in Nova Scotia's economic growth. The federal government holds constitutional responsibility for the aboriginal people of Canada. However, Nova Scotia can work collaboratively with Nova Scotia Mi'kmaq and the Government of Canada to ensurie that appropriate training and education opportunities are available.

Links have already been established between Nova Scotia Mi'kmaq and the energy sector. The Maritimes and Northeast Pipeline and its parent company, Westcoast Energy Company, have instituted policies designed to increase aboriginal participation in their operations. In December 1999, the Assembly of Nova Scotia Mi'kmaq Chiefs signed an agreement with Maritimes and Northeast Pipeline that guarantees Mi'kmaq a say on the environmental impact of the province's natural gas pipeline project and a share in the work created. The agreement specifically includes:

- Mi'kmaq monitoring of the environmental impact of the pipeline over the life of the 25 year project;
- job targets for Mi'kmaq contractors during construction and operation of pipeline facilities;
- a percentage of contracts for Mi'kmaq people and businesses;
- money for training and scholarship funds for Mi'kmaq interested in working in the business;
- aboriginal awareness workshops;
- a liaison office and a Mi'kmaq advisory committee; and
- assurance that Mi'kmaq interests, including sacred and traditional-use sites, will continue to be protected along the pipeline route.

Membertou Band and Sodexho Marriot have recently signed a memorandum of understanding to explore jointly the desirability of mutually beneficial collaborative efforts to develop projects in the Maritime Provinces (Nova Scotia, New Brunswick, P.E.I.). Under the agreement, Membertou and Sodexho Marriott will provide hospitality services, such as catering, housekeeping, commissary, laundry and other company-related services. Specifically, the two parties will bid on the federal Set-Aside

Program contracts and seek business opportunities in remote site operations such as those carried out by the offshore oil and gas industry in the Maritimes.

Membertou has also signed a memorandum of understanding with SNC-Lavalin to explore mutually beneficial collaborative efforts to develop projects in the Maritime Provinces. Through this partnership Membertou can provide a host of engineering services for both the offshore gas sector and onshore construction and design.

Other examples of Mi'kmaq business capacity include the Aboriginal Alliance of Companies and the existing network of economic development officers in Mi'kmaq communities. These positive examples show that such relationships can be established and enhanced, and they signal significant opportunities for aboriginal peoples as the industry matures.

Investment and financial opportunities build capacity in aboriginal communities. Through gaming arrangements, Nova Scotia has created a significant revenue capacity in individual Mi'kmaq communities. The approximately $20 million flowing to these communities provides a substantial ability to take advantage of emerging economic opportunities, including those that may occur within the energy sector.

As energy-related developments proceed, it is important to avoid potentially negative impacts on Mi'kmaq historical and cultural traditions. Any resource development has the potential to discover or disturb cultural artifacts and items of historical importance. Any such discoveries must be protected and reported to the Nova Scotia Museum, a body that is active and knowledgeable in this field.

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Part IX

Research and Development

Seizing the Opportunity

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Research and Development

Statement of Principle

Nova Scotia's growing energy sector should be used to significantly strengthen our capacity for innovation and to establish the province as a leading-edge energy research and development centre.

One of the essential components of a successful modern society is a culture that supports innovation through research and development (R&D). The energy sector presents a rich and diverse set of research and development opportunities. With respect to oil and gas, commercial operations in Nova Scotian waters will soon begin in deep water at the very edge of technology. Our climate and environment provide unique operational challenges and opportunities.

Energy research and development opportunities are not restricted to oil and gas. They include energy efficiency, conservation, renewable sources, and the rapidly expanding field of clean coal technology. Nova Scotians have a window of opportunity to become involved in R&D activities that could support the existing energy sector while preparing for the eventual transition from non-renewable to renewable sources of energy.

Nova Scotia has a diverse and experienced research and development community and infrastructure in place. It is capable and well positioned to create synergies among all the relevant players-universities, government, and the private sector-to develop a broadly based, world-class capability in energy-related innovation. Once focused on a common purpose, this community could act as an important economic catalyst for decades to come.

Government Role and Responsibility

The federal government presently promotes innovation-based research in its own laboratories, some of which are prominent in this province. The most important of these from an energy perspective are:

- the Bedford Institute of Oceanography, which includes the Department of Fisheries and Oceans (DFO), Natural Resources Canada (NRCan), and Environment Canada (EC);
- the Defense Research Establishment, Atlantic (DREA); and
- the Atlantic Regional Laboratory of the National Research Council (NRC).

The federal government also exerts a strong influence on university research through its administration of various funding agencies, such as the Natural Sciences and Engineering Research Council, Canadian Foundation for Innovation and the Atlantic Innovation Fund.

The provincial government also supports energy-related R&D indirectly through funding for universities and colleges, and directly through a variety of activities and agencies. For example, the province maintains a significant geoscience database and has expertise related to onshore petroleum. It also supports two research organizations: the Atlantic Canada Petroleum Institute (ACPI) and InNOVAcorp.

Strategy Objectives

- To enhance the province's research base so that it has the capacity to support Nova Scotia's emerging oil and gas sector, develop new approaches to its traditional coal sector, and guide it through the eventual transition to an energy economy based on renewable resources.
- To create university/college-private sector-government partnerships that will strengthen energy-sector research and development, and help multiply provincial funding with private and federal research money.
- To create a culture shift in Nova Scotia toward a knowledge and innovation-based economy through enhanced research and development in energy.

Actions to Achieve Objectives

2001-2005

- Develop and host a major energy research forum as a follow-up to the 2001 Nova Scotia energy forum Open to the World. This is to showcase Nova Scotia's research capacity and to help match that capacity with interested private sector partners in particular priorities: deepwater technologies and operations, clean coal technology, energy conservation and efficiency, renewable energy research and development, and impacts of the hydrocarbon industry on the marine fishery and environment.
- Initiate the first phase of a three-phase Nova Scotia Public Energy Research Strategy, with the aim of encouraging a shift in research capacity toward the energy sector.
- Develop incentives to encourage offshore energy producers to use revenues from development of non-renewable energy resources to further research in renewable energy sources.
- Secure commitments, whenever possible, from potential hydrocarbon developers for research and development initiatives, or possible partnerships with researchers as part of the offshore strategic energy agreement (OSEA) approach to developing our offshore resources.
- Establish a Research and Development branch within the Department of Energy to focus government leadership and coordinate provincial efforts.
- Work with the fishing industry, DFO, and ACPI to bring research initiative to bear on potential conflicts that might arise from multiple uses of environmentally important areas.
- Prepare the way at the outset for the transition, at the end of five years, to Phase 2 of the Nova Scotia Public Energy Research Strategy. This transition will build on the research base established during the contract activities encouraged in Phase I and will address the creation of public-private consortia that will focus on important commercial opportunities.
- Encourage commercial development of proprietary inventions through the creation of joint ventures or start-up companies, thereby leading to the full development of Phase III activities.

Links to Energy Strategy Themes

Encouraging innovation will strengthen Nova Scotia's capacity to manage change in all sectors of the economy. Using revenues from non-renewable energy sources to help fund R&D of renewable energy sources will enhance conservation and create clean fuel technologies, including clean coal technology. This approach acknowledges the presence of Nova Scotia's strong academic research base and will use it to increase our knowledge-intensive workforce. Making the eventual transition to renewable energy sources will help **Power our Economy** and **Secure our Future**.

Background

Role of Research and Development

Research and development are two parts of the innovation continuum. Research, the discovery of new knowledge, is a principal activity of universities as well as some government and private laboratories. Development is more appropriately the domain of industry, where new knowledge can be turned into more concrete forms, such as inventions or applications useful to society.

The Nova Scotia Context

Nova Scotia is blessed with a rich and diverse academic sector. The province has seven universities with energy-related research capabilities. Dalhousie University, the largest research institution in the province, contains more than 100 researchers engaged in activities that complement the oil and gas industry. Each institution boasts strengths in one or several research areas relevant to the energy sector. Public investment in R&D has until recently served a very narrow community, but more and more these strengths are also being used to assist in the development of knowledge-based and innovation-dependent commercial activities. In a sense this completes the circle by providing a societal return on the original investment. This practice is already underway in some sectors in Nova Scotia, but considerable potential exists for its extension into the energy realm.

Nova Scotia Public Sector Research Capacity

Federal Government

The federal government operates a number of research institutions in the province. Research in support of offshore issues is centred at the Bedford Institute of Oceanography, which is administered by the Department of Fisheries and Oceans, and which houses research activities by four federal agencies-DFO, Natural Resources Canada, the Department of National Defence (DND), and Environment Canada-plus the Canadian Hydrographic Service and the Environmental Protection Microbiology Laboratory. Major research programs are carried out in marine geoscience, fishery science, and a broad array of ocean sciences that involve many environmental fields.

Two other federal agencies have regional offices in Nova Scotia. The Defence Research Establishment Atlantic, a component of DND's research capacity, is an important world-recognized acoustic-signal processing facility. Until about eight years ago it was closed and top secret, but it has gradually made its expertise available to the community, usually through contract research. The Institute for Marine Biosciences is a National Research Council regional laboratory with a reputation for collaborative research in aquaculture, and especially genomics.

Provincial Government

The provincial government has a focused research capability in several areas relevant to the energy industry. Regional geoscience of onshore areas is the responsibility of the provincial government, which delivers services through databases and expertise delivered by the Department of Natural Resources (DNR). DNR also monitors and participates in programs aimed at environmental geoscience, such as innovative approaches to capturing and sequestering industrial emissions of CO_2.

Universities

Dalhousie has the largest university research capacity in Atlantic Canada. Dalhousie conducts $70 million to $80 million dollars in externally funded research annually. It has acknowledged strengths in earth sciences, engineering, oceanography, atmospheric sciences, biology, environmental studies, law, medicine and health, economics, management, and a full array of social sciences. It also houses some specialized institutes and programs, such as the Centre for Marine Geology, the Health-Law Institute, and the Atlantic Canada Petroleum Institute. DalTech offers Master of Engineering (M.Eng.) and Master of Applied Science (M.A.Sc.) in Petroleum Engineering degrees. Petroleum research at DalTech is further supported by the Killam Chair in Oil and Gas.

Research capabilities in a wide variety of fields relevant to energy are present at other universities. St. Mary's University has the well known Gorsebrook Institute, which is concerned with applied fisheries. St. Francis Xavier is moving rapidly to establish a small core of researchers dedicated to working on offshore energy issues. Acadia University has a strong tradition of biological and environmental research, including the Atlantic Centre for Estuarine Research, which tackles social and environmental issues related to the Bay of Fundy. The University College of Cape Breton is fulfilling a role in the economic renewal of Cape Breton Island through various supportive technical activities, and is moving rapidly into technical training for the offshore in fields such as petroleum operations and petroleum development. The University College of Cape Breton maintains the Centre of Excellence in Petroleum Development and Education, as well as the Shell Canada Process Operations Lab. As well, the Nova Scotia Community College recently increased its commitment and funding for R&D activities.

Private Sector Research Capacity

A number of major oil and gas companies have reduced or eliminated their internal research laboratories. The industry trend is to contract with external agencies, experts, and universities to conduct focused research on topics with commercial possibilities. Despite this trend, several key Nova Scotia players do have proprietary research capabilities. Schlumberger, a major service provider, supports both approaches by maintaining two research institutes which also routinely work with selected research partners.

Exxon Mobil has a very large research centre in Houston currently headed by Ken Miller, a former senior manager in development of the Sable project. Shell also maintains strong internal research and development capacity. It is presently pursuing research on deepwater technologies, including ways to drill robotically from the seafloor. Shell is also engaged in a five-year, US $1 billion program of research into renewable energy technologies such as wind power and photovoltaics.

Government expects companies interested in developing offshore oil and gas to participate in research and development activities within Nova Scotia. For example, the Sable Offshore Energy Project (SOEP) is using the ACPI to help facilitate its Research and Development commitments. Such joint efforts tend to produce priority research faster with less duplication of effort.

Outside the oil and gas sector, Emera Inc. conducts research in the area of CO_2 sequestration, green-power opportunities, and environmentally friendly technologies. For smaller companies, the provincially owned InNOVAcorp has a mandate to encourage technology development through incubation, venture investment, and mentoring.

Global Energy Research and Development

Energy research and development has been a global priority for many years. In 1974 the International Energy Agency established a program specifically to assist with the development and eventual commercialization of new and improved energy technologies. This program covers such areas as fossil fuels, renewable energy, energy end-use technologies, and fusion power. It enables experts from different countries to work collectively and share results.

The International Energy Foundation facilitates the transfer of research and technology in all areas of energy, with special emphasis on developing countries. The foundation is "interested in better ways to produce, transmit, and conserve energy with respect to the technical, economic, and human dimensional elements, including global climate change."

The United States has recently proposed its own Energy Institute. The bill has been passed by the House of Representatives and is waiting for Senate approval. Like the ACPI model, it would take industry money, plus matching government money, to fund certain kinds of R&D. Conoco and Haliburton are the two companies currently spearheading this initiative. ACPI has been invited to sign a memorandum of understanding with this institute.

Public Advice

The public advice on using oil and gas revenues to make the transition to the post-hydrocarbon era was consistent and pervasive.

Analysis

The Importance of Research

It is generally accepted that R&D benefits natural resource development in a number of ways: adding value, enhancing technology, improving efficiencies, mitigating environmental impacts, and generally bringing science and technology to bear on traditional approaches.

Research and development are as applicable to conventional energy sources, such as oil, gas, coal, and electricity, as they are to renewable and alternative sources, such as wind, biomass, or hydrogen fuel cells. R&D can expand and deepen traditional knowledge and open new frontiers. R&D can lead to improved profits, additional market opportunities, and local job creation.

In addition, R&D could be used to pursue alternative fuel opportunities. Using oil and gas royalties to explore renewable energy technologies might eventually lead to a stronger energy presence with greater long-term opportunities.

Research in Nova Scotia

The province has a large research community, employing the second highest number of Ph.D.s per capita in Canada, second only to the Ottawa region. Federal per capita research funding, is near the top, reflecting the large number of universities and government laboratories in Nova Scotia. Considerable capacity already exists in this community to carry out research in fields directly related to energy development such as physical oceanography, geology and geophysics, organic chemistry, and various fields of engineering. Considerable indirect capacity can also be found in disciplines that may not appear to have immediate relevance, such as information technologies, genetics, physics, and medicine.

The energy sector presents plenty of opportunities for growth in Nova Scotia's research community. Energy issues tend to be complex, and marked by rapidly changing science and technology. A mix of competitive pressures and environmental considerations are forcing change and the need to innovate. Balancing the needs of the energy community with the opportunities they present requires extensive and sophisticated understanding. However, both research and development-based innovation can be costly, sometimes even beyond the reach of all but the most committed companies. Therefore, the immediate issue at hand is how to harness a portion of the resident research community, which is not necessarily focused on energy-related research, and encourage it to make a commitment in an efficient and expeditious manner.

Comparing R&D Experiences

Other jurisdictions (such as Aberdeen, Calgary, Houston, St. John's), confronted with the presence of a growing oil and gas industry, have asked the question "How do we maximize our peripheral returns from this new opportunity?" The response has often been generic, through vigorously pursuing direct industry-related activities such as training, engineering, and support services. Although this approach may be appropriate for these centres, it can also be somewhat restrictive.

A generic approach both benefits and suffers from its lock-step association with the oil and gas industry. Reduced industry activity, as is occurring in the North Sea, or even eventual depletion of the resource, greatly reduces the number of associated jobs and forces the people doing them to look elsewhere for employment. For example, universities and companies in Scotland are now expressing serious interest in becoming involved in Canada's offshore.

The second shortcoming in this generic approach to peripheral R&D opportunities is that development of oil and gas expertise does not prepare the community for the inevitable transition away from those energy sources. Nova Scotia has an advantage because, while the energy strategy acknowledges the need for local R&D to complement conventional energy sources, it also emphasizes the full breadth of the energy spectrum and the expertise that will be required in fields other than oil and gas, such as activities contributing to a long-term transition to renewable energy sources.

Nova Scotia's Research Needs

Government will encourage the development of incentives to create a sustainable R&D infrastructure that could work with, complement, and broadly interact with the energy sector. Given that the possibilities within that sector are broad and Nova Scotia's resources are limited, the province will seek to focus new research capability in specific areas that are especially important to our community, and that offer real possibilities for commercial accomplishment.

Deepwater Technologies and Operations

Approximately one-half of the exploration drilling commitments in offshore Nova Scotia are located on what is known as the continental slope, where water depths can vary from 100 metres to 4,000 metres. The continental slope holds great interest for the industry because large oil and gas fields have been found in similar geological settings around the Atlantic Rim, in West Africa, Brazil, and the North Sea. Although drilling and production technologies have improved, many opportunities for improvement remain. If additional significant discoveries are made offshore Nova Scotia, many new opportunities will emerge for commercial applications.

In anticipation of the growing importance of the deep continental slope over the next few years, a number of partnerships are being developed through the Atlantic Canada Petroleum Institute. These partnerships may be similar to Demo 2000, headquartered in Norway, which uses oil and gas industry funding to do R&D on deepwater technology, and the United Kingdom, which has a similar organization focused on deepwater research.

For the past six or seven years, Deepstar, a consortium of oil and service companies headquartered in Houston, has examined technology challenges associated with deepwater drilling. Through its committee structure, it has produced and pursued specific R&D plans. ACPI plans to partner with Deepstar on a vortex-induced vibrations (VIV) project and perform some of the research work regionally.

Another means of pursuing R&D is through vehicles known as joint industry projects (JIPs), which are currently driven out of Oslo and Houston, but are certainly not limited to those locations. JIPs identify specific technology challenges and delineate plans to solve them. Memberships are then sold to interested industry companies who then develop the technology and use it. ACPI has proposed joining a JIP on deepwater drilling.

Academic research can also be extremely useful to the oil and gas industry. A case in point is the Ocean Drilling Program, which has been underway for more than 30 years and has provided a great deal of insight on hydrocarbons along with its fundamental research interests (see www.cceandrilling.org). MARGINS is a program devoted to studying the continental margins of the world, which also happens to be where most offshore oil and gas are located (see www.ldeo.columbia.edu/margins/).

General Improvements for East Coast Offshore Operations

Newfoundland and Labrador has shown considerable leadership in cold-ocean engineering and iceberg research, both of which apply directly to the design and operation of offshore petroleum structures. The Nova Scotia offshore has significant operational challenges because of its unique atmospheric and oceanic operating climate. For example, more research is required to better couple the atmosphere and the ocean into useful predictive circulation models that could be used to predict the trajectory of an offshore spill or locate a person accidentally lost overboard.

Clean Coal Technology

The development of clean coal technologies tailored to circumstances in Nova Scotia could improve the burning of provincial coal in an environmentally acceptable manner. It is essential that the technologies ultimately developed be cost-effective. Besides the problem of CO_2 emissions, local coal generally has high concentrations of sulphur. Some new technologies hold out the promise of dealing with both. Nova Scotia will continue to have a significant component of coal in its energy mix for many years. NSPI's current coal-fired generators produce the lowest cost electricity, other than hydro, and contribute to jobs and economic development through the direct use of a local resource. See Volume II part V: Coal for a detailed discussion of clean coal technology.

Energy Conservation and Efficiency Technologies

An equally important approach to achieving provincial environmental goals is to reduce energy consumption in two important ways: conservation and greater efficiency in use. Both approaches benefit from improvements in technology. Technological advances that are useful locally could potentially have value in other markets and jurisdictions. Besides offering a decrease in environmental impacts, a saving in consumption might also be viewed as an alternative to building new generation capacity.

Renewable Energy Research and Development

The energy strategy targets wind energy as an important opportunity to begin generating a meaningful proportion of Nova Scotia's electricity needs from renewable sources. Research and development in recent years have resulted in dramatic decreases in the cost of wind-generated electricity, with a concomitant increase in installations worldwide. Ongoing refinement of the technology will continue to improve the competitiveness of this energy source. Research efforts with respect to other renewable energy sources could produce a similar effect. Locally, considerable work remains to be done on the potential of geothermal energy, while fuel cell technology is rapidly becoming economically feasible as a domestic alternative. Research in this latter case might have potential impact for the local consumer while moving Nova Scotia researchers into a field described by many as the pathway of the energy future.

Impact of the Oil and Gas Industry on the Ocean Fishery and Environment Sectors

Although much research has been done on the impacts of oil and gas on the marine environment, little has been done specifically for Nova Scotia. The potential growth of Canada's offshore industry dictates that environmental research will have to keep pace with exploration and development. Better knowledge is required about the impact of seismic exploration on specific species, about the need for more detailed knowledge on patterns of migration, and especially about the interplay between the fishing industry, coastal communities, and oil and gas companies. Volume II Part II, Section 2: Energy and the Fishery and the Marine Environment identifies this interplay as necessary to build a climate of trust and understanding between the two groups.

Other Options

As opportunities arise for relevant research, the province's R&D agenda will be continually tackling priority issues. The following questions could offer some assistance in future determinations of research as to its "goodness of fit" for Nova Scotia.

- Is the proposed research a duplication of efforts from other jurisdictions?
- Does the proposed research have the potential to improve efficiencies and competitiveness?
- Will the proposed research advance the goal of developing economically viable renewable energy sources?
- Will the proposed research permit the leveraging of funds from other funding sources?
- Does Nova Scotia have sufficient research strength in the proposed research area?

Increasing Research in Nova Scotia

Two approaches are being developed to encourage the Nova Scotia research community to consider new opportunities in the energy-related realm:

- creating a supportive and catalytic energy-research climate for public researchers, and
- creating a private-sector research base.

The Public Research Base

Nova Scotia, especially the Halifax-Dartmouth area, has often been cited for its knowledge-based critical mass, and considerable untapped potential for commercial innovation. Although local research capacity is both broad and deep, it has only a few areas of focus or concentration. Medicine, oceans, and IT have a sizable numerical presence but are notable principally for their academic achievements. However, only a small number of our researchers are focused on commercialization of R&D opportunities, and while university-industry interactions do occur and are increasing, they are usually one-off or ad hoc.

Researchers often are not familiar with the needs of the private sector. For research commercialization, some form of partnership is frequently required. Participation by local companies has proven to be a large advantage in other places. For instance, universities in Ontario and Quebec are surrounded by companies, large and small (such as General Motors, Microsoft, Research in Motion, Ontario Hydro, Bombardier), that are accessible and usually willing to seek cooperation and collaboration on various R&D activities. The physical presence of the commercial culture can pervade the university, eventually influencing researcher behaviour.

Until recently, Nova Scotia possessed very few major companies needing research and development support. Most of those were indifferent to collaboration. Smaller companies are usually struggling, under-capitalized, and preoccupied with survival; they consequently have little flexibility. One exception has been Clearwater Fine Foods and its wholly owned subsidiary Ocean Nutrition Canada, both of which have been aggressive users of local R&D.

The Sable Offshore Energy Project has had an impact on the local energy R&D situation and raises the prospect of further change. The SOEP partners (ExxonMobil, Shell Canada, and Emera Inc.) and PanCanadian Energy have a significant presence in Nova Scotia and a number of other oil and gas companies, such as Marathon Oil and Kern-McGee, are becoming very active players. In addition, major changes have occured in Emera Inc. regarding both its stake in the offshore and its involvement in electricity and renewable energy. The presence of these companies, if properly engaged, will enhance the immediacy, relevance, and focus of their R&D work for academic researchers, thereby helping to catalyze change.

Nova Scotia provides less provincial support for research than any other province in Canada, except its three Atlantic partners. This is in contrast to the fact the province is endowed with a very high per capita research capacity. Excluding shared funding, such as that obtained from federal cost-shared agreements like ACOA or CFI, the provincial contribution is very small, and is focused in areas such as medical research. However, financial support for R&D is not the government's only responsibility. Government functions as a facilitator, catalyst, policy maker, lobbyist, cheerleader, and supporter, while also providing guidelines, incentives, and, focus. In other successful provinces a continuing presence by government, along with researchers and the private sector, has facilitated the marshalling of resources to realize R&D potential.

Nova Scotia Energy Research Strategy

Although Nova Scotia is rich in institutions and personnel that routinely perform research and development, relatively few of these pursuits are directed toward the energy sector. Realizing that research and development are potentially important tools for implementing the goals of the energy strategy, new mechanisms will be employed to create additional R&D capacity or redirect existing capacity.

Building or redirecting capacity will not occur quickly or spontaneously. It will be a stepped process, extending over an extended period and requiring some form of incentives. The leadership role of the province at the outset is critical and consistent with the goals of the energy strategy. A three-phased approach to building public research capacity in energy proposed.

Phase 1: Drawing Researchers into High-Priority Projects

The first phase will be a form of outreach from the province to the researchers, likely in the form of funding for specified contractual research. This will signal the importance of R&D and explicitly solicit external participation, create incentives for research, and provide the initial conditions for collaboration between government, the private sector, and the researcher.

To be most effective, any money invested by governments should be leveraged with industry's participation. Several sources for research money are available, including cost-shared funds from ACOA (Atlantic Innovation Fund), and other federal departments and agencies. Each case will need a business plan and joint agreement. Private-sector support will be required for specific industry-relevant initiatives. In-kind support is one option that can be pursued with respective research institutions.

The energy strategy goals and objectives will form the initial basis for developing an energy R&D focus, and the contract-research approach will be pursued for three to five years. It will take time to create the infrastructure, develop relationships, and generally show researchers energy R&D has potential. One to two years is a reasonable length for a single small-scale project. In five years, two cycles will have been completed and evaluated.

Phase 2: Developing Consortia Focused on Important Commercial Opportunities

The second phase is the creation of consortia with private, public, and university partners. Federal funding for centers of excellence, Canadian Foundation for Innovation initiatives, and other shared initiatives can provide significant funding that will permit long-term associations, well-defined business plans, and close association with the private-sector recipient of the innovations. Initiatives such as these can run for up to five years and be renewed. As problems and opportunities become better delineated during the first phase, one or more consortia are expected to emerge. This is the approach used successfully by Heriot-Watt University in Britain, and many of the Quebec and Ontario universities in all of the national R&D competitions to date. The most important product of a partnership is the continuing dialogue between the three cultures, eventually resulting in shared goals and ideals, and commitment to common initiatives.

Phase 3: Encouraging Commercialization

Contractual success leading to more refined and focused research, carried out by consortia, would yield proprietary results that could either be absorbed by the partner companies or spun off into joint ventures or new companies. At this point, the process would become self-sustaining, with continual government involvement but more extensive interactions between the private sector, the researchers, and their institutions.

Government Focus

The province recognizes that fostering a broad research and development strategy requires leadership and focus. The new Energy Department will develop a small group to work with other governments, the universities, and the private sector to coordinate this growth. The group will help to build the partnerships, secure funding through Offshore Strategic Energy Agreements, and help identify research opportunities.

Creating a Private-Sector Research Base

In the energy industry, R&D tends to focus on development activities. This practical problem-solving approach enhances competitive advantage and is responsible for many breakthroughs in many industries. History has shown that knowledge gained in one area is often adapted for use under circumstances never envisaged by the discoverer.

A vibrant private-sector R&D infrastructure is critical to a successful energy strategy. Private-sector research brings benefits beyond its development applications. Successful efforts to draw worldwide research money to Nova Scotia will increase economic activity and the province's innovation capacity. Researchers and scientists like to be in communities with others of like interest. Therefore, promotion of broadly defined "energy research and development" activities could become a catalyst to increase Nova Scotia's innovation capacity in many areas.

Incentives for R&D for Renewable Energy and for Conservation and Efficiency

Government will consider the development of incentives to encourage private-sector research where the private sector brings investments of its own to Nova Scotia for local R&D As part of their development plans, it is anticipated that companies will contribute to the R&D infrastructure in this province, by bringing in-house capability to Nova Scotia or by building new capability for energy R&D opportunities that will contribute to the provincial industry.

The province will examine R&D incentives in areas such as renewable energy, clean coal technology, and offshore deepwater technologies. Any incentives will be coordinated with federal efforts. Companies that produce oil and gas offshore Nova Scotia will be encouraged to bring worldwide R&D activities in these areas to Nova Scotia.

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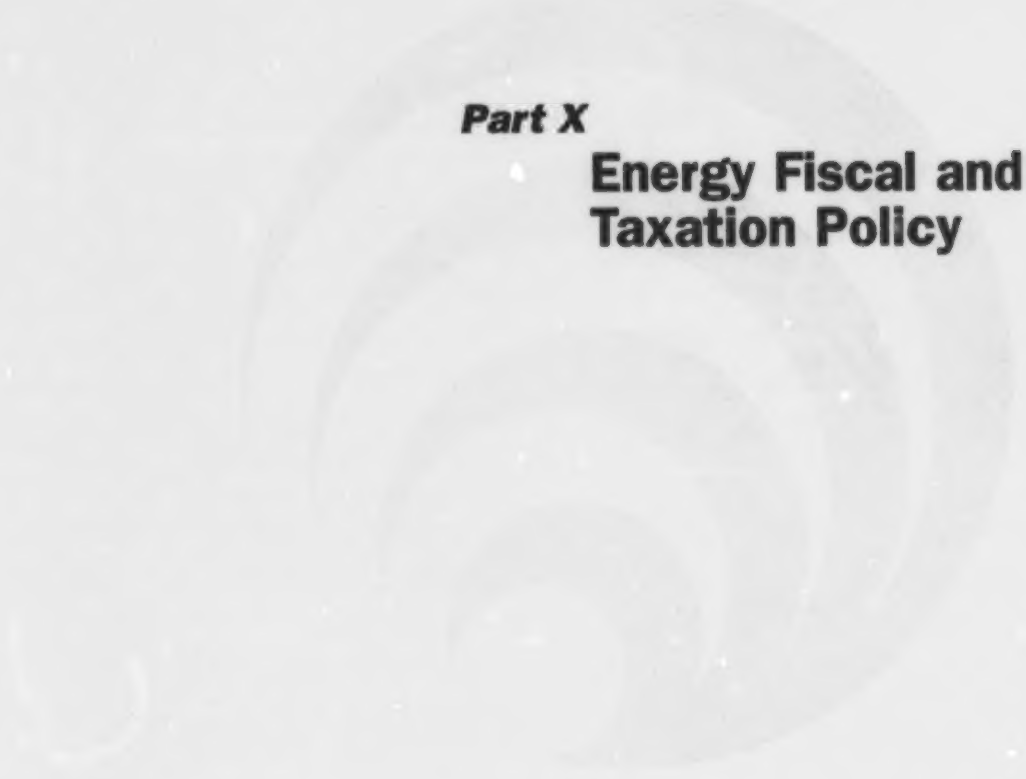

Part X

Energy Fiscal and Taxation Policy

Seizing the
Opportunity
Volume 2

Nova Scotia's Energy Strategy

NOVA SCOTIA

Part X Energy Fiscal and Taxation Policy

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Energy Fiscal and Taxation Policy

Statement of Principle

A positive business climate will create a stronger economy and improve the province's financial position. Supporting the growth of Nova Scotia's non-renewable offshore oil and gas industry will in the long term generate significant royalties to be invested in building a diversified and sustainable economy.

A positive business climate and competitive tax regime based upon principles of equity, efficiency, and effectiveness set the stage for business enterprises to make the kind of large-scale, long-term capital investments required by industry, including the growing energy sector. They also set the stage for widespread economic spin-offs and sustained economic growth to the benefit of all Nova Scotians.

Although direct gross royalties from offshore oil and gas are projected to become a meaningful part of gross provincial revenues starting around the middle of the decade, they are projected to account for approximately 2% of total annual net revenues after the federal government's equalization claw-back is taken into account. It is therefore essential that Nova Scotia retain a higher share of its offshore revenues and become the principal beneficiary of its resources as originally intended, in order to accomplish long-term diversification and economic sustainability.

Two important characteristics of offshore revenues are their limited duration and the fact that, historically, oil and gas prices and revenues have been very volatile. It will be prudent, therefore, to use the net incremental revenues from offshore resources in ways that permanently improve the economic and fiscal state of the province.

Government Role and Responsibility

It is generally recognized that the provincial government's fiscal responsibilities include:

- ensuring that provincial taxation levels for individuals and businesses are competitive,
- ensuring that the province's financial position is strong, with manageable levels of debt, and
- supporting innovation and investment.

By creating a business climate that encourages economic activity from the offshore and related development, the province should receive new provincial income tax and consumption tax revenues, and an increasing stream of royalties. The fiscal arrangements for offshore oil and gas are guided by the Canada-Nova Scotia Offshore Petroleum Accord, the Offshore Petroleum Royalty Act and related regulations, and other provincial and federal fiscal legislation, including the Income Tax Act and the Fiscal Arrangements Act (which covers the equalization program).

The province currently has a very high debt burden and interest expenses that consume a significant percentage of annual revenues. This situation requires sound long-term financial management if Nova Scotia is to recover its financial freedom and become capable of providing sustainable services for future generations.

Strategy Objectives

- To develop a business and social environment in Nova Scotia that is able to compete in the global energy industry.
- To use direct oil and gas revenues to permanently transform the province's economy and improve its fiscal position.

Actions to Achieve Objectives

2001-2005

- Continue to practice strong fiscal management in an open, conservative, and responsible manner.
- Maintain government's understanding of the fairness and competitiveness of the province's fiscal regimes.
- Institute a rigorous process of continuous self-assessment through competitive surveillance and benchmarking. Share this knowledge with the public and industry and use it for strategic advantage.
- Bundle existing and future business incentives into a Nova Scotia Energy Industry Growth Program, and develop a communication and marketing plan to introduce this program aggressively to energy-related businesses on a global scale. Develop as a first step the business case for R&D incentives in such energy-related fields as renewable energy, energy conservation, and clean coal technology.
- Coordinate all provincial government fiscal and taxation policies and practices so that an effective and consistent financial plan is communicated to government employees, the business sector, and the public.
- Develop a long-term financial and taxation plan to manage the expected revenues from a growing non-renewable energy industry. Establish a clear and measurable economic criteria and accountability framework to govern the use of such revenues.
- Release a range of royalty estimates founded on prudence and conservatism. This will underscore the sensitivity of royalty revenue forecasts to such potentially volatile variables as commodity prices and production rates.
- Work with the Government of Newfoundland and Labrador and other provincial and territorial governments to create and negotiate a fiscal regime for natural resources with the Government of Canada that is fair and fulfills the principle that provinces should be the primary beneficiaries of those resources. The Government of Nova Scotia will continue its Campaign for Fairness, and will expand its invitation to the energy industry to support the campaign.

Factors Leading to a Change in Strategy Direction

- Once offshore royalties become "net incremental revenues," the province will establish a Nova Scotia Offshore Heritage Trust to receive and manage a portion of the net royalties from offshore oil and gas for the benefit of future generations.

Links to Energy Strategy Themes

By using oil and gas revenues primarily for long-lasting improvements to the Nova Scotia economic situation, the government assures Nova Scotians that service levels for programs do not depend on volatile oil and gas revenues. Long-term economic investments will help **Power the Economy** in the short term, and **Secure our Future** through permanent transformation of the economy.

Background

Nova Scotia Competitive Position

Offshore Development Opportunity

The discovery of new sources of hydrocarbons will lead to an increase in energy supplies available in Nova Scotia, and to an increase in economic opportunities directly in the energy sector and in related industrial developments that take advantage of abundant energy supplies. Spin-off benefits from the development of our energy resource are also positive for unrelated industries and will help Nova Scotians gain new technical skills and job opportunities. The key to unlocking this potential is the underlying business climate that encourages and supports energy sector investments.

Elements of a Competitive Business Climate

A number of key economic and business factors go into assessing a particular area's potential for energy developments. Some of the factors are common to all business sectors, such as proximity to market, availability of a skilled workforce and capital, and a competitive tax climate. However, the energy sector also has its own set of characteristics and requirements.

Preliminary Nova Scotia Assessment

Non-Tax Factors

To understand the role that the tax system may play in helping or hindering energy sector growth, it is first necessary to consider Nova Scotia's position with respect to non-tax factors. See Table 1 for a preliminary assessment of the relative strengths of some key non-tax factors for Nova Scotia.

As can be seen, Nova Scotia has a number of strengths, and faces some challenges that government must take into account when setting tax policy. For example, the risk inherent in petroleum exploration offshore Nova Scotia, due to relatively high operating costs and uncertain resource size, has been recognized in the province's high-risk royalty regime (see following).

Nova Scotia Royalties and Taxes

Royalties

Royalties are the economic rent paid by a producer to the resource owner. Establishing the level of an economic rent normally takes into account the value of the resource. Setting a royalty value by volume or production level is likely to deter high capital-cost development in times of low price assumptions. It will

Table 1. Assessment of non-tax factors.

Attribute measured	Ranking	Reasons
Exploration and Development		
Prospectivity	medium	Potential has to be confirmed by discoveries
Proximity to market	high	Natural gas pipelines in place; Nova Scotia is closer than other natural gas basins such as Gulf of Mexico or western Canada; major oil refineries and markets nearby
Availability of skilled workforce	medium to high	Some skills gaps; many skills shared with other jurisdictions; most skills can be acquired by training
Security of Supply	high	Nova Scotia is a safe and reliable source of energy for the province, Canada and the United States, which has increasing value in a world that is more concerned about security issues
Operating costs	medium	Harsh winter climate and distance from shore makes offshore exploration and development costs higher than Gulf of Mexico or West Africa, although comparable to North Sea; multiple offshore regulators result in somewhat higher costs
Energy-Dependent Sector such as Electrical Generation Petrochemicals, Smelters, etc.		
Proximity to market	medium	Electrical grid to New Brunswick too small for significant electrical exports; distance to market in northeast USA or central Canada for finished goods higher than for many competitors
Availability of skilled workforce	medium to high	Some skill gaps; many skills shared with other jurisdictions; most skills can be acquired by training
Operating costs	high	Low Canadian dollar and generally low business costs makes Nova Scotia very competitive on general business operating costs

also lead to significant missed opportunities for the resource owner in times of high price assumptions. In other words, the resource owner will likely face the situation of seeing development proceed only when the price assumptions are high. Setting a royalty based on value allows projects to proceed on a larger range of price assumptions and allows the province as resource owner to share in price rises.

Nova Scotia Royalty System

Nova Scotia's royalty system is designed to encourage development by setting a lower, incentive-based "gross revenue royalty" rate in the early years of a project. The province's share rises as the capital invested is recovered and a reasonable rate of return is achieved. In this fashion, the explorer and eventual developer have a degree of protection for their large investment if price assumptions prove to be too optimistic and the project goes through a period of low revenues or even losses.

However, once a project's cumulative cash flow matches the cash invested in the project plus a reasonable return on investment, the net cash flow from that point forward is subject to a more generous royalty regime known as "net revenue royalties." Because it was the province's first large-scale offshore development project, the Sable project had a special royalty arrangement (see Table-2). It was considered a high-risk start-up project with respect to offshore construction and operation and onshore pipeline construction.

Table 2. Sable Offshore Energy Project royalty regime.

	Gross revenue royalty
Tier 1	1% of gross revenues for 36-month period, at which point royalties move to next tier
Tier 2	2% of gross revenues until simple payout + return allowance (based on 10-year Canada Bond Rate + 5 percentage points), at which point royalties move to next tier
Tier 3	5% of gross revenues, until simple payout + return allowance (based on 10-year Canada Bond Rate + 12.5 percentage points), at which point royalties move to next tier
	Net revenue royalty
Tier 4	30% of net revenues, until simple payout + return allowance (based on 10-year Canada Bond Rate + 45 percentage points),* at which point royalties move to next tier
Tier 5	35% of net revenues*

*minimum of 1% or 5% of gross revenue payable, depending on average gas price

The generic royalty regime that will be used for future projects divides projects into two categories: high risk and low risk (see Table 3). Discoveries in areas such as those around Sable Island are known as low risk because the geology is reasonably well understood and the success rate reasonably well established through multiple wells. Most other areas offshore Nova Scotia are higher risk in the sense that the geology is not well understood, and fewer wells have been drilled.

Current Assessment of Nova Scotia Royalty Regime

The Nova Scotia royalty regime has been found to be competitive through internal and external analysis. In a 2001 independent report by Professor Campbell Watkins, honorary professor of economics at the University of Aberdeen, entitled Atlantic Petroleum Royalties: Fair Deal or Raw Deal? Professor Watkins concludes that "although there is room for improvement, the regimes [of Nova Scotia and Newfoundland] in fact stand up to rigorous examination: they do provide a fair return to the provinces and citizens while not in themselves discouraging further development of the industry."

One of the areas noted for improvement would involve moving from bidding based on "drilling commitments" to bidding based on "cash payments for right to drill." As discussed in Part II, Section 1:

Table 3. Nova Scotia generic royalty base regime.

	Gross revenue royalty
Tier 1	2% of gross revenue until simple payout + return allowance (based on 10-year Canada Bond Rate + 5 percentage points), at which point royalties move to next tier
Tier 2	5% of gross revenue until simple payout + return allowance (based on 10-year Canada Bond Rate + 20 percentage points), at which point royalties move to next tier
	Net revenue royalty
Tier 3	20% of net revenue until simple payout + return allowance (based on 10-year Canada Bond Rate + 45 percentage points), at which point royalties move to the next tier*
Tier 4	35% of net revenue*

* minimum of 5% of gross revenue payable

Note: In areas of high risk (which is much of the area outside Sable Island at the present time) the net royalty regime stops at Tier 3 for the first project in a particular area. Subsequent projects in that area are subject to the full net royalty regime. The high-risk designation is intended to encourage exploration and the development of projects in areas that have had little exploration success to date.

Offshore Exploration, the government is prepared to consider such a move once the resource base is more firmly established.

Royalties are not the only component of a government's share of an oil or gas project. Governments also levy corporate and capital taxes. As is shown in Figure 1, Nova Scotia's generic royalty regime is quite competitive on this "Government Share of Net Cash Flow (Royalties and Taxes on Profit)" for the United Kingdom, New Zealand, Australia, Gulf of Mexico, Norway, Holland, and Newfoundland and Labrador.

(Percentage)

Source: Nova Scotia Petroleum Directorate

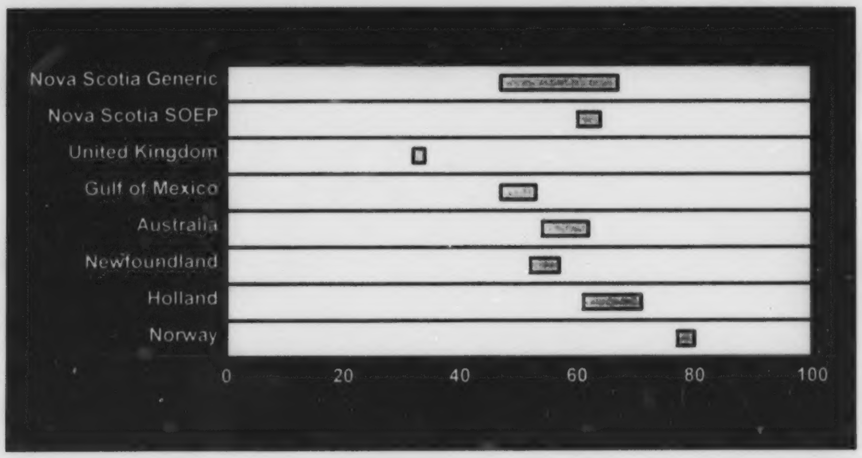


Figure 1. "Government Share of Net Cash Flow" (Royalties and Taxes on Profit).

Taxation Principles

In general, tax policies are guided by the principles of *equity*, *effectiveness*, and *efficiency*. *Equity* means entities that are alike are treated similarly; *effectiveness* means the tax policy achieves the outcomes expected; and *efficiency* means without waste. Within these principles are subsets that include issues such as simplicity, transparency, flexibility, predictability, and neutrality. The proper application of these principles is expected to result in a competitive tax system.

Nova Scotia's General Tax Situation

Nova Scotia's tax system is continuously monitored and measured against other Canadian jurisdictions to ensure that it is competitive, especially with respect to the neighbouring Atlantic provinces. Each province may have different priorities and policy objectives that result in different approaches. However, it is the overall tax burden on businesses and individuals that is monitored and evaluated.

The current tax system in Nova Scotia recognizes the long-term nature of capital investments and the need for innovation. This is reflected in the R&D investment tax credit and the accelerated capital cost allowance treatment for certain capital investments. The federal tax system recognizes specific incentives for investments in Atlantic Canada and has also developed a program to make Canada's shipbuilding and offshore fabrication sector more competitive through loan insurance and interest buy-downs.

Corporate Taxation Summary

General corporate taxation of oil and gas activities within Nova Scotia (both onshore and offshore) comprises primarily:

- federal and provincial income taxes on a corporation's taxable income (which is determined in identical fashion federally and provincially);
- federal and provincial capital taxes on a corporation's taxable capital employed (the definition of which is harmonized federally and provincially); and
- federal-provincial harmonized consumption tax (the harmonized sales tax) at 15% on taxable goods and services, using a value-added approach that includes full input tax credits (ITCs) for most businesses on taxes paid for business transactions.

These taxes are administered by a single agency, the Canada Customs and Revenue Agency (CCRA).

Income Tax Allocation Issues

An important benefit from development of the Nova Scotia offshore oil and gas industry is the increase in provincial tax revenues that flow from the increased employment and business opportunities in this area. The Nova Scotia Department of Finance will continue to work with the CCRA to ensure corporate and personal income tax reporting is consistent with a developer's records on benefits reporting.

Energy Sector Tax Issues

In addition to the general tax implication from corporate income taxes, the energy sector has a number of tax issues of particular relevance:

- Federal income tax payable may be reduced by an investment tax credit of 10% earned on qualifying expenditures in Atlantic Canada. Qualifying expenditures include, among other things, the acquisition of buildings, machinery, or equipment primarily for use in oil and gas exploration or production. A special concession is made to Canadian-controlled private corporations to allow for 40% of the tax credit to be refunded, for an amount in excess of taxes payable.
- The provincial research and development tax credit is in addition to a similar R&D tax credit offered by the federal government (Scientific Research and Experimental Development). It is administered by Canada Customs and Revenue Agency using their application and approval process. The provincial tax credit is a refundable credit and the rate is 15% of eligible expenditures for all corporations.
- Depreciable property used in oil and gas activities is deductible for tax purposes by claiming capital cost allowance (CCA) on a declining balance basis (see Table 4 for relevant rates).
- Special resource-related deductions are available in respect of certain expenditures not qualifying for capital cost allowance (see Table 5). These discretionary deductions are computed on a declining balance basis.
- Provincial royalties are not deductible in determining taxable income. Instead, a corporation may claim a resource allowance of 25% of its "resource profits" (basically a corporation's net income from the production of oil and gas before any of the resource-related deductions).
- Special rules have been developed within federal tax legislation to allow for the transfer of unclaimed resource-related expenditure balances to another corporation (the "successor corporation" rules) or to a corporation's shareholders (using flow-through shares).

Table 4. Canadian capital cost allowance relating to oil and gas.

Class	Expenditures	Rate (%)
41	oil and gas well equipment	25
8	other tangible equipment	25
10	computer hardware and system software	30
1	pipelines not part of a gathering system	4

Other Nova Scotia Tax Features

A number of other jurisdictions have payroll taxes to finance measures such as health care. Nova Scotia does not levy such payroll taxes. The provincial sales tax was abolished in 1996 with the introduction of

Table 5. Special deductions.

Category	Expenditures	Rate (%)
Canadian Oil and Gas Property Expense (COGPE)	• oil and gas rights and royalty interests	10
Canadian Exploration Expense (CEE)	• geological, geophysical, and geochemical • drilling / completion of dry holes or discovery wells	100
Canadian Development Expense (CDE)	• drilling / completion not otherwise included as CEE	30

the harmonized sales tax (HST). The capital tax on large corporations and the municipal taxes on property are discussed in more detail in the following sections.

Taxes with Capital Investment Implications

Capital Tax on Large Corporations-Taxes on corporate income are sensitive to business profitability. That is, if a firm is not making a profit, no taxes are due. However, the Canadian income tax system has become much more complex than that. A number of allowances and credits are given for public policy reasons. Losses may be carried forward or backward. As a result, a firm may show profits under general accounting rules, but not under tax accounting rules. These differences are usually an issue of timing rather than ultimate taxability. These timing adjustments are designed to make the tax system fairer, but they also make it more difficult to predict what and when the revenues will be collected.

Taxes that are insensitive to profitability tend to discourage capital investments. This is particularly true for investments that generate goods to be exported to competitive markets. Similarly, in the Nova Scotia market, capital taxes tend to make capital-intensive energy sources more expensive than non-capital intensive energy sources. For example Nova Scotia Power Inc. has reported that it is paying approximately $7.2 million annually on its taxable capital.

The impact of capital taxes on the competitiveness of Nova Scotia has to be evaluated in context with the other taxes paid by the energy sector, as it is usually the overall tax and business climate that affects business investment decisions.

Municipal Taxes - Municipalities also tax value rather than profits. For many businesses and residents the issue is not considered unreasonable because the relationship between the value of their property and the municipal services received is roughly in balance. Assessments for commercial rental properties explicitly consider the rent paid as a factor in establishing assessment value. However, the relationship between cost of service and taxes for capital-intensive assets can become significantly misaligned. As a matter of public policy, the province has recognized this issue when it comes to machinery and equipment.

To encourage manufacturing and processing, the province is in the final stages of phasing out any requirements for property taxes to be paid on machinery and processing equipment. New investments have been exempt since December 1, 1988, and existing machinery and equipment used in manufacturing and processing will become completely municipal-tax free as of January 1, 2004. The law and its interpretation on these matters has developed over a number of years.

A dispute between the energy industry and municipalities has recently arisen with respect to the interpretation of municipal assessment taxes on energy-sector processing and pipelines between the energy industry and municipalities. The provincial government and the Union of Nova Scotia Municipalities appointed Lorne Clark, former Chief Justice of the Supreme Court of Nova Scotia, to mediate the dispute. His report concluded that the current tax policy and the Assessment Act should be examined to establish Nova Scotia's competitive position in this area.

Municipal Taxation of Electrical Utilities - NSPI, the major electrical utility in Nova Scotia, pays grants in lieu of property taxes based upon a formula that is related to electrical use in the various municipalities. This policy was developed at a time when the utility was a Crown corporation. Government and its agencies are not usually subject to property taxation in the same way the private sector is. The current formula generates $5.62 million for the municipalities in 2000/01, plus an amount that was negotiated between the Union of Nova Scotia Municipalities and the province during the introduction of the harmonized sales tax. The current arrangements result in total payments to municipalities of $11.62 million in 2000/01, rising to $15.56 million in 2002/03.

Nova Scotia's Capital-Intensive Sector Mix

Based on an analysis of the province's capital tax on large corporations, Nova Scotia's taxable base for capital-intensive investments is approximately $18 billion, generating an annual tax revenue of approximately $45 million (general tax rate 0.25%). This base is generated from the national tax allocation formula and includes commercial office and retail buildings, apartment buildings, and industrial entities such as Nova Scotia Power, Michelin, and the Sable Offshore Energy Project. The provincial capital tax was originally scheduled to expire on March 31, 2002, but has been extended for at least one year due to financial pressures on the provincial treasury. Its future applicability and design will be reviewed.

The arrival of new natural gas and oil energy sources has the potential to significantly expand the province's capital base over the next few decades. For example, potential near-term incremental industrial projects include Sable Offshore Energy Incorporated (SOEI) Tier II ($1 billion) and PanCanadian's Deep Panuke project ($1 billion). Given favourable market conditions, including competitive prices for natural gas in the next decade, Nova Scotia could also see the construction of smelters ($2 billion to $3 billion) and various elements of a petrochemical industry ($1 billion to $3 billion).

The government recognizes that growth in this sector also requires a long-term capital-investment business climate that is competitive with other jurisdictions. Although Nova Scotia has a relative advantage on proximity to the energy source and the New England marketplace for commodity products, the province is still some distance from markets for finished and semi-finished products.

Possible Impacts of Energy Revenues on Nova Scotia's Fiscal Position

Volatility of Energy Revenues

An important issue that Nova Scotia will face as it begins to generate revenues from offshore development is the volatile nature of energy prices. Huge swings in prices, driven by the market value of the commodity, can result in significant changes to government tax revenues on corporate profits and to royalty revenues. This is a significant challenge for all countries, states, and provinces that depend on natural resource revenues.

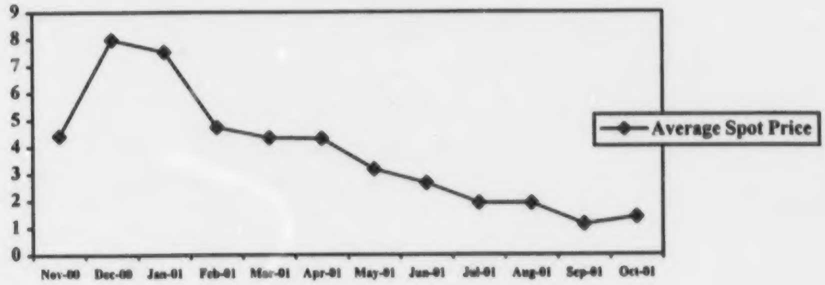
As an example, in the spring of 1985 Norway derived 25% of its budget revenues from offshore revenues and had significant trade surpluses. By the spring of 1986 offshore revenues had dropped to less than 10% of budget revenues and trade deficits were significant. Revenues fell from US$7.0 billion to US $2.5 billion. An examination of the fiscal situation in Alberta over the past six years shows a similar history or volatility (see Table 6).

Table-6. Alberta oil and gas resource revenues, 1996-2002 ($ millions).

1996/97	1997/98	1998/99	1999/00	2000/01	2001/02 estimate
4,151	3,909	2,480	4,784	10,842	6,219

Recent natural gas prices have been more volatile than energy prices in general. The range over the past 12 months is an example of the difficulty Nova Scotia may face when setting budget targets in the face of such volatility (see Fig. 2). Producers, consumers, and governments failed to forecast this degree of volatility.

Figure 2. Monthly Natural Gas Prices at Goldboro, NS (US$).



Source: Daily Oil Bulletin price at Dracut, Massachusetts, less M&NP toll

Royalty Revenues-the SOEP Regime

The SOEP royalty regime was based on three assumptions:

- the project would produce 3.5 trillion cubic feet of gas over 25 years;
- it would receive US$1.80 (in 1995 dollars) per million British thermal units (MMBtu) at the Goldboro gas plant gate (i.e., the final marketplace price minus any transportation costs in getting there); and
- natural gas prices would subsequently rise at an annual assumed rate of inflation of 1.5%.

Under these assumptions the total royalties from SOEP were originally projected to be $2.5 billion over the 25-year period, peaking in 2007.

Royalty projections are highly sensitive to fluctuations in gas price and production rates. For example, while short-term prices for natural gas initially exceeded expectations, peaking in December 2000 at approximately four times the forecast price, by October 2001 prices had returned to more historic averages.

The effect of price volatility on Nova Scotia royalties is twofold. First, gross revenues fluctuate based on prices, directly affecting gross royalties. Second, gross revenues affect the timing of project payout and thus the beginning of the higher net revenue royalty tiers.

Managing Non-Renewable Energy Revenues

Unlike the royalty revenues, corporate income taxes are a tax on company-wide profits and thus reflect company-wide revenues and expenses, including allowances for drilling elsewhere, allowances for resource depletion, etc. This revenue source is more difficult to forecast because of the complexities of the allocation formula for corporate income tax revenues among the provinces.

Nevertheless, if the resource base is confirmed and multiple projects proceed, there will be incremental new net revenue royalties to Nova Scotia. The difficulty arises if all such revenues are incorporated into continuing program spending.

Two issues emerge. First non-renewable resources eventually come to an end. By definition, they will not be able to indefinitely sustain continuing program requirements. Second, even in the medium term, a dependence on volatile revenues leaves the province vulnerable during periods when energy prices are in the low range of their cycles.

Therefore, it is prudent to plan to reserve a reasonable portion of net revenues for long-term purposes. It is important that Nova Scotia's economy and financial position not continue to lag significantly behind the rest of Canada, with debt levels and interest expenses still very high, especially at the time when our non-renewable energy resources are depleted.

Savings Trust Fund Concept

Alberta encountered this issue 25 years ago. In 1977, at a time of rising revenues for the oil and gas sector, the provincial government created the Alberta Heritage Savings Trust Fund (Heritage Fund). The province originally placed 30% of non-renewable resource revenues in the fund. Today the fund has over $12.3 billion in its portfolio of low-risk and prudent investments. During this period, the province has still borrowed money to finance key public sector investments, and to cover budget deficits. However, that debt is currently being paid down by budget surpluses and now stands at $6.3 billion. Therefore on a net basis (the Heritage Fund minus the provincial debt), Alberta has positive net financial worth of approximately $6 billion.

According to three-time Alberta premier Ralph Klein, the purpose of the Heritage Fund was to address the issue of how to generate long-term value from a source of income that will not last forever. "Albertans do not want to leave the burden of debt to our children. We will be leaving them a very large savings account for future generations when oil and gas resources and revenues eventually run out," he said.

During the course of its history, the Heritage Fund has lent money to other provinces (such as Nova Scotia, Quebec, Newfoundland and Laborador, Prince Edward Island, New Brunswick, and Manitoba); helped diversify the Alberta economy in technology, bioscience, forestry, medical research, education, and training; and helped reduce the province's debt and interest expenses.

There are similar examples in the United States of energy-producing states setting aside portions of their revenues in trust funds for specific purposes and future generations, although none as dramatic and successful as Alaska's Permanent Fund Corporation. The fund has a value of approximately US$24 billion as of October 2001. Although most of the capital dedicated to the fund remains in the fund, a dividend payout also takes place. The value of the annual dividend to each resident of Alaska ranged in 2000 from approximately US$330 to just under US$2,000.

In 1990 the government of Norway established the Norwegian Government Petroleum Fund to safeguard long-term considerations in the use of petroleum revenues. The income of the fund includes the central government's net cash flow from petroleum activities and the return on the fund's capital. Expenditures from the fund consist of an annual transfer to cover any non-oil budget deficit. This acts as a buffer to smooth short-term variations in the oil revenues, and it serves as a tool to cope with financial challenges connected to an aging population, and the eventual decline in oil revenues, by transferring wealth to future generations.

The Norwegian net cash flow from petroleum activities is estimated at US$22.6 billion in 2002, which implies net transfers to the Government Petroleum Fund of $18.6 billion. The overall surplus on the fiscal budget and the Government Petroleum Fund in 2002, including interest and dividend income in the fund, is estimated at $21.3 billion.

In Britain, no such trust fund has been established. In December1999 the Institute of British History and the Science Museum held a seminar that reviewed the history of development of North Sea oil and gas. One of the contributors was Dr. Ian Rutledge, honorary lecturer in energy studies at the University of Sheffield. He closed the seminar by saying,:

> "Should there be a special oil fund for the North Sea windfall? Yes….Have the benefits of the North Sea been wasted in Britain? I think if we ask our grandchildren what they can see of the oil industry - maybe I'll ask my grandchildren in ten years' time, what there is to see - it will be very difficult to point to anything. I think that is a great pity. Maybe we need to erect some kind of folly that will show people that the industry actually existed because, other than that, I don't think there will be much for them to observe."

Offshore Fiscal Fairness

The issue of ownership of energy resources off Nova Scotia's coastline was set aside in the Canada - Nova Scotia Offshore Petroleum Resources Accord of 1986. The Accord also contains principles that "recognize the right of Nova Scotia to be the principal beneficiary of the Petroleum Resources in the Offshore Area."

The failure of the Offshore Accord to achieve its intent of making the province the "principal beneficiary" of its offshore resources is not just a challenge for the Government of Canada and the province. It is in the best interests off all parties, including industry, that a positive business environment prevail and that the citizens of Nova Scotia know they are getting a fair return for the extraction and consumption of their non-renewable petroleum resources. In the absence of a higher share of offshore resources being available to accelerate growth of a diversified economy, there will continue to be friction and unsatisfied expectations.

Public Advice

Many public workshops suggested the need to use revenues from the oil and gas industry as a bridge to the post-hydrocarbon era, a time frame of between twenty and fifty years. In that context, a long-term strategy requires Nova Scotia to use this window of opportunity to take advantage of non-renewable resources to ensure they contribute long-term tangible benefits from offshore developments and help build a diversified and sustainable economy for when the resource revenues are gone.

In addition, public advice supported the idea of using at least a portion of offshore royalty revenues to help do the research and development work required to bring potential renewable energy technologies into commercial use.

Analysis

Creating a Competitive Nova Scotia Business Climate

Nova Scotia's Competitive Position

A preliminary assessment of Nova Scotia's competitive business climate position suggests a relatively strong position in some areas, with challenges in others. To understand the position in more depth and to target measures for specific areas, a more detailed assessment is required, including components of the economy that relate to the energy sector such as prospectivity, labour skills, business infrastructure, proximity to market, transportation, and taxation. It will compare Nova Scotia to other Canadian energy-producing provinces, U.S. energy-producing states, and relevant countries, in areas such as exploration, offshore development, and ability to build a competitive industrial base from offshore energy supplies (e.g. petrochemical industries and intensive energy users such as power generation and smelting).

Information needed for a more complete assessment of the province's competitive position is already available from some industry sectors. For example, a competitive ranking of some Canadian provinces and American states is already complete with respect to petrochemical industrial production.

Preliminary Competitive Assessment

If Nova Scotia's resource potential is confirmed, the province will be in a generally strong competitive position and no broad industry-wide tax changes are required. However, certain energy-related initiatives, such as renewable energy, and energy efficiency and conservation, will likely need encouragement, and the tax system is an efficient way to provide it. The government recognizes that development of onshore facilities and natural gas usage (i.e., a petrochemical industry) will not take place without a competitive business climate, including a competitive tax climate.

Detailed competitive assessments will be done in conjunction with the government's ongoing taxation policy review.

Nova Scotia Tax Review

The Government of Nova Scotia has been conducting a broadly based review of its taxation system since the fall of 1999. A preliminary report in the spring of 2000 was followed up by a second report in the spring of 2001. Those reviews resulted in an extension of many tax credits and the discontinuance or modification of others.

The introduction of new energy sources and energy developments raises new opportunities for the province and new challenges for its taxation system. Energy-sector tax policies will be reviewed regularly to ensure that the system is flexible enough to take into account these new developments and to remain competitive.

Municipal grants in lieu of taxation for electrical utilities is an example of an area that will have to be reconsidered at some point. In the longer-term the method of property taxation will be reviewed for all energy utilities. As competition for electrical generation emerges the current method of utility taxation may no longer be appropriate. The review will take into account that electricity is an essential service and that an increase in taxation on regulated assets is passed on to electrical consumers through higher prices.

Federal Cooperationl Potential

The province will also assess opportunities to leverage existing incentive programs. It will seek regional cooperation and opportunities for the federal government to be a more active player in using tax incentives for economic development. The eligibility of capital investments in Atlantic Canadian oil and gas projects for tax credit under the federal government's corporate income tax regime is a key incentive to examine. Leveraging federal government programs and funding is important to optimizing Nova Scotia's future energy sector opportunities.

Industry Cooperation Potential

Leveraging industry support is also important. The ability of public-sector investment to attract private investment is important, especially in such areas as training, research and development, renewable energy, and energy conservation and efficiency.

Potential for Tax Incentives

As a result of the ongoing reviews and assessments, the Nova Scotia business climate for the energy sector will continue to be competitive. New initiatives can be expected to focus on:

- areas that are important to the province but may not be currently competitive,
- opportunities to encourage innovation, and
- opportunities to provide incentives for new economically promising and environmentally friendly energy technologies such as wind generation.

The government is also monitoring potential federal incentives in these areas and will seek opportunities to coordinate provincial initiatives with the federal ones.

Promoting Nova Scotia Tax Advantages

While some new initiatives will be considered, Nova Scotia has considerable advantages within the current tax system that are already available to all businesses. For example, the province has a full 15% sales tax (HST) rebate, investment tax credits, a payroll rebate program, R&D incentives, training and education programs, and a very competitive Canadian dollar. Nova Scotia's portfolio of general business incentives is competitive with places such as Newfoundland and Labrador, Louisiana, and Mississippi.

To help investors assess the Nova Scotia advantage, the province will support marketing efforts to package all tax and support programs that are available to the energy sector. Working with the Department of Economic Development and the Department of Finance, the new Department of Energy will develop detailed promotional tools for the full spectrum of potential energy investments. An important element of the promotional package will be the bundling of tax programs, existing and new, into a Nova Scotia Energy Industry Growth Program.

Fiscal Impacts from Energy Revenues

Revenue Forecasts

It is important not to start counting Nova Scotia's resource revenues before they are received. As discussed previously, royalties are designed to become a significant income stream when a project has recovered its cash capital investment costs and achieved a reasonable return on the investment.

There is currently only one producing project, SOEI Tier I. Its projected 25-year full-life royalties range from $1.6 billion to $2.3 billion, depending on natural gas prices and eventual recoverable reserves. The current estimate for SOEI royalties peaks at approximately $300 million per year. Under current federal-provincial equalization claw-back mechanisms, this will result in net incremental revenues for Nova Scotia in the amount of $90 million.

The two most promising near-term projects are PanCanadian's Deep Panuke and SOEI's Tier II. These two projects are nearing the development plan stage and have high probabilities of becoming producing developments. After that, everything depends on successful exploration drilling, mostly in very deep water.

Revenue Volatility

Nova Scotia will eventually face the challenge of budgeting in an environment of rapid resource price changes and fluctuating resource revenues. The energy strategy supports the Department of Finance's practice of prudent budgeting and revenue forecasting in this area to avoid the pitfall of unanticipated revenue drops. It also supports the principle of ensuring that revenues are not completely used for continuing programs and that a percentage of annual offshore revenues be allocated to an enduring trust.

Use of Non-Renewable Energy Resource Revenues

Use of Royalties for Long-Term Benefits

Nova Scotia has the opportunity to learn from Alberta, some U.S. states, and other countries with respect to the successful long-term management of revenues from non-renewable resources.

The opportunity for increased offshore revenues and greater benefits for all Nova Scotians could begin as early as calendar year 2003, when the initial three-year rate on royalties from the Sable Offshore Energy Project ends. The minimum annual royalty will move to 2% of gross revenues (double the current 1%) or higher, depending on whether the project investors have recovered their investment and earned the stated rate of return.

Once a project has recovered its costs and earned a reasonable return, the royalty payments rise rapidly and run between 20% and 35% of a project's net cash flow. It is in this period of project operation that the province earns its most significant revenues and has the greatest opportunity to put a portion aside for long-term economic and financial improvement.

The province does incur certain costs associated solely with its responsibilities for the offshore, for example, a portion of the Utility and Review Board, most of the Petroleum Directorate, and 50% of the Canada-Nova Scotia Offshore Petroleum Board. Over time, the new Department of Energy will work with the Department of Finance to identify specific government initiatives that are of an enduring nature and can be undertaken with offshore revenues. Examples include:

- creating a better-educated and skilled workforce, and improving training and apprentice programs;
- adding to the provincial budget surplus to enable permanent reductions in provincial debt and annual interest payments, thus improving government's ability to fund programs; and
- improving the competitive position of Nova Scotia by reducing personal and corporate income tax levels.

The Nova Scotia Offshore Heritage Trust

Nova Scotia will draw on the experiences of Alberta and other energy-producing jurisdictions that have established long-term savings funds. The government supports the concept of a Nova Scotia Offshore Heritage Trust (Heritage Trust) that receives and manages a portion of the net royalty revenues.

The purpose of the Heritage Trust will be more clearly defined once the higher net revenue royalties are closer to reality. The basic concept of an enduring trust serves to provide long-term evidence that the benefits from the offshore will be managed for future generations.

To be enduring, the trust would have to be established in a way that it builds capital and in the longer term spends only the interest earned on activities such as R&D to ensure there is a sustainable energy sector after the natural resources are extracted; purchasing provincial debt to lower the net debt of the province; and other prudent investments that leverage the economic and social strengths of the province.

The start-up of the Heritage Trust will be consistent with the province's overall fiscal plan and debt management plan. There is little point in placing funds into a trust unless the funds are truly surplus to normal annual provincial budgetary requirements. The rise in the value of the Heritage Trust would improve the province's financial position.

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Part XI

Consolidated Strategy Objectives and Actions

Seizing the
Opportunity
Volume 2

Nova Scotia's Energy Strategy

NOVA SCOTIA

Consolidation of Strategy Objectives and Actions

Part II Oil and Gas

Section 1. Offshore Exploration

Strategy Objective

- To encourage widespread exploration for hydrocarbons in the Nova Scotia offshore area consistent with environmental objectives and safety objectives.

Actions to Achieve Objectives

2001–2005

- Maintain a stable, predictable, and competitive fiscal system to enable oil and gas explorers to quantify the financial risk and rewards associated with their exploration efforts.
- Maintain the current royalty regime, which encourages exploration efforts in under-explored higher risk areas.
- Work with groups and processes already established to improve knowledge and understanding of commercially important and environmentally sensitive marine areas. (Eastern Scotian Shelf Integrated Management process and CNSOPB's Fisheries and Environment Advisory Committee).
- Work with the energy and fishing industries and the federal government in the process to establish new regulations to implement the extension of the Canadian Environmental Assessment Agency requirements for seismic and drilling activities.
- Using geological and geophysical information gathered in the current round of exploration efforts (50 active exploration licences plus those pending), update the estimate of the resource potential in the offshore area.
- Use latest information on offshore potential to promote the offshore in a variety of forums.
- Consult with coastal communities and fishing interests before issuing exploration rights within sight (18 km.) of Cape Breton and mainland Nova Scotia.

Events that may Result in Strategy Adjustments

- Once a significant amount of broad exploration effort is completed, examine the rights issuance process with a view to working with the federal government and the CNSOPB to create a system that identifies broad areas for exploration with opportunity for public comment, prior to calling for industry nominations.

- Once a significant amount of broad exploration activity is completed and once a significant number of projects are established, examine the work-commitment bidding system.

Section 2. Energy and the Fishery and the Marine Environment

Strategy Objectives

- The Development of long-range plans for ocean management and usage during exploration and production of oil and gas resources.
- The Achievement of a climate of trust, open information sharing and fair issue resolution between the oil and gas industry, the fishery and coastal communities.

Action Steps to Achieve Objectives

2001-2005

- Work with the Department of Fisheries and Oceans, the CNSOPB, the fishing industry and CAPP to identify known areas of fishing activity – their magnitude and importance. Identify important ocean ecosystem factors and areas of sensitivity, such as spawning grounds, migration routes or unique coral reefs.
- Enhance consultation mechanisms between governments, regulators and the industries. As a first step, the provincial Department of Agriculture and Fisheries and the Department of Energy will create a forum for government and the fishing industry to discuss long-term policy issues.
- Support efforts by others to consult on fisheries and oil and gas issues.
- Work with the CNSOPB to establish utility corridors to concentrate pipeline and other underwater utilities to minimize the amount of land used for these activities.
- Establish as a provincial policy that before issuing exploration rights within sight of land on Cape Breton and mainland Nova Scotia, (approximately 18 km) there will be special consultation with the fishing industry and coastal communities.
- Work with groups and processes already established to improve knowledge and understanding of commercially important and environmentally sensitive ocean and coastline areas. (Eastern Scotian Shelf Integrated Management process and CNSOPB's Fisheries and Environment Advisory Committee)

- Work with the energy and fishing industries and the federal government to participate in the process to establish new regulations to implement the extension of the Canadian Environmental Assessment Agency requirements for seismic and drilling activities.

Events that may Result in Strategy Adjustments

- Once the current round of exploration activity is complete, the province will support a review of the rights issuance process. The approach to be examined is one where the offshore is divided into specific areas. At any given time, the CNSOPB would identify which areas are open for nomination and give public notice.

Section 3. Benefits from Offshore Resources

Strategy Objectives

- To maximize Nova Scotia employment and training in the oil and gas industry, with particular reference to skilled occupations for which there is potential for employment over the long term and in which skills are transferable to other industry sectors.
- To optimize oil and gas business opportunities for existing and new Nova Scotia based companies with particular reference to:
  - ongoing oil and gas production,
  - engineering design and project management,
  - construction and fabrication of offshore and onshore facilities,
  - goods and services that can be exported competitively, and
  - goods and services that can be extended/adapted into other sectors.
- To set the stage for petrochemical industrial development by ensuring that natural gas and gas liquids supplies are available on a commercially competitive basis.
- To provide access to market-based opportunities for natural gas customers in the residential, commercial and industrial developments sectors.
- To take advantage of Nova Scotia's proximity to the natural gas supply and its lower transportation costs.
- To develop Nova Scotia-based research and development initiatives.
- To create a high level of public understanding about the economic impact of offshore exploration, development, and production.

Actions to Achieve Objectives

2001–2005

- Government will vigorously pursue opportunities to maximize the economic value of its offshore resources by full participation in the regulatory approval process. Government's position on the project will depend upon the degree to which a project meets the province's objectives.
- The government intends to reach Offshore Strategic Energy Agreements (OSEA) with the developers of each offshore project. An OSEA is a voluntary agreement process designed to address how a project will help the province to achieve its objectives. Some of the issues which will be addressed include:

1. The project developer's assessment of the underlying economics of the project, including assumptions about energy supply and demand in the markets to be served.
2. The project developer's plan to achieve Nova Scotia's economic objectives including those outlined in the benefits plan to be filed to the CNSOPB.
3. The project developer's plan to increase Nova Scotia's capacity and capabilities for gaining value from the offshore.
4. Measurement of Nova Scotia's overall economic gains from the project.
5. The province's rights and requirements with respect to investment in pipeline infrastructure.

- Promote local supplier and support-industry development and business opportunities. Particular emphasis will be given for enterprises that have identified areas of local competitive advantage or niches with worldwide trade potential.
- Work with the private sector to identify, assess, and promote the development of additional fabrication capacity in the province.
- Work with regulators, the energy companies and the service/support sector to ensure benefits reporting information is collected in a more efficient manner.

2006 and Beyond

- Review the success of the OSEA process.

Factors leading to a change in Strategy Direction

If and when substantially larger discoveries of natural gas and oil are achieved, the province will fully review oil and gas benefits objectives to ensure that they are in line with changing capacity and skills of its workforce and success of its entrepreneurs.

Section 4. Training for the Energy Sector

Strategy Objectives

- To increase the skills and work experience opportunities level of the current and future Nova Scotia workforce.

Actions to Achieve Objectives

2001-2005

- The Department of Energy and the Department of Education will co-ordinate industry's identification of skills gaps and the partnership opportunities with the federal government.
- Support the Department of Education's objectives to increase interest in science and technology-based courses and education choices.
- Negotiate energy company project development contributions to segregated training funds.
- Encourage the oil and gas sector and the NSCC to work together in establishing targeted training programs to address company-specific development needs. One example is the recent partnership agreement established between NSCC and PanCanadian Energy to prepare technical personnel for their offshore program.
- Concentrate training development efforts in areas that have a high demand or are niche areas that are not being met elsewhere in Atlantic Canada.
- Support training development partnerships that enhance and extend the capabilities of NS-based institutions. For example, NSCC's Memorandum of Understanding with the Southern Alberta Institute of Technology (SAIT).
- Ensure NSCC and Nova Scotia universities have the capacity to meet the labour market needs of the oil and gas sector. Specifically, in preparing Nova Scotians for employment in the sector, as well as addressing the ongoing training and development needs of companies within the sector.
- Support industry efforts to expand experience building at all levels from apprentices to professionals to management.
- Hold an Atlantic Canada Petroleum Industry Skills Forum to identify training needs and programs.
- Continue to support the Apprenticeship Training model through active industry participation in program development, training delivery, and apprentice registrations/retention.

Section 5. Using Nova Scotia Resources

Strategy Objectives

- To design and administer an efficient regulatory system that ensures the effective development of a safe and reliable natural gas delivery system;
- To maximize the economic benefits to Nova Scotians from the delivery and use of natural gas;
- To establish policies that enhance access by Nova Scotians to sufficient supplies of natural gas and gas liquids from the offshore;
- To set the stage for commercially viable petrochemical development;

Actions to Achieve Objectives

Local Gas Distribution, 2001-2005

- The provincial government will rely on market forces to establish the supply, demand, and pricing of natural gas and gas liquids.
- The provincial government intends to negotiate the terms under which natural gas and gas liquids will be available for delivery to Nova Scotia businesses and homes with each gas project developer in Nova Scotia.
- The provincial government will eliminate the policy requiring a fixed access target of 62% of all households and service to all 18 counties within seven years. The market will dictate the build-out of gas distribution.
- The provincial government will facilitate the development of a municipal tax agreement between the gas distributor and municipalities. It will also establish an assessment policy for energy utilities in the province.
- The provincial government will participate as an active intervener in Utility and Review Board hearings regarding the issuance of distribution franchises, the development of market rules, and the setting of tolls and tariffs.
- The province will permit bundling of gas service by distributors. This will be subject to a future review by the UARB.
- The provincial government will continue to support further use of the Maritimes and Northeast Pipeline Inc.'s laterals policy.
- The provincial government will implement a plan for early conversion of government buildings to natural gas where it is economically feasible to do so.
- The provincial government will encourage producer-funded incentives to promote natural gas use in Nova Scotia.

- The provincial government will work with industry to develop and provide information for the public on the use and benefits of natural gas.
- The provincial government will continue to assist in the identification of skills gaps and the training of Nova Scotians to support the delivery and use of natural gas and gas liquids.
- The provincial government will work to streamline its regulatory procedures.

Promoting Industrial Development, 2001-2005

- The provincial government will adopt the policy that offshore pipeline routing will be restricted to a limited number of corridors, and that all pipelines carrying Nova Scotia gas or liquids from the offshore will land in Nova Scotia.
- The provincial government will adopt the policy that each project development with significant quantities of natural gas liquids will be planned in such a manner that it contributes to the potential development of a petrochemical industry in Nova Scotia.
- The provincial government will continue to promote unique transportation and proximity advantages, such as the Goldboro bypass option, to industrial gas users.
- The provincial government will promote opportunities for petrochemical development in Nova Scotia.
- The provincial government will implement the new Underground Hydrocarbon Storage Act in order to provide a clearer regulatory approval process for the development of underground gas storage in Nova Scotia.
- The provincial government will be an active intervener to advance Nova Scotia interests at all relevant National Energy Board and Federal Energy Regulatory Commission hearings on facilities, tariffs, and toll applications.

Section 6. Onshore Exploration

Strategy Objectives

- To encourage continued exploratory activity for oil and gas and coalbed methane in the onshore Nova Scotia area.

Actions to Achieve Strategy Objectives

2001-2005

- Promote the onshore resource potential through increased participation at oil and gas trade shows, presentations at technical conferences, and meetings with petroleum industry clients.
- Continue to work with the province's interdepartmental One Window Standing Committee to coordinate the onshore regulatory approval process.
- Maintain an up to date geoscience database and develop in-house geoscientific expertise on the Carboniferous and younger sedimentary basins.

Events that may Result in Strategy Adjustments

As discoveries are made onshore the province may need to: (1) perform a new resource assessment and use this information to estimate potential hydrocarbon resources, and (2) re-assess the onshore royalty regime system.

Section 7. Effective and Efficient Regulation

Strategy Objectives

- To eliminate areas of unnecessary regulation.
- To eliminate areas of regulatory overlap and duplication.
- To create a regulatory system that effectively and efficiently protects the public interest in areas such as health, safety, the environment and efficient resource use.
- To develop a process through which the Offshore Accord can facilitate an effective and efficient administrative system for oil and gas.

Actions to Achieve Objectives

2001-2005: Offshore

- Initiate discussions between the province, Natural Resources Canada, the CNSOPB, and the Canadian Association of Petroleum Producers (CAPP) about the issues identified in CAPP's Regulatory Issues Matrix. This review should focus on designing improvements to processes and realizing outcomes.
- Work with the federal government and the CNSOPB to:
  - conduct a review of the effectiveness of the regulatory requirements in the offshore area;
  - have the CNSOPB report its views and recommendations to the federal and provincial governments; and
  - reach agreement between the levels of government on which recommendations will be implemented and the plan for such implementation.
- Prepare a comprehensive review of benefits-related information presently submitted to regulators, the federal government, and the province. Identify clear reporting objectives, gaps, overlap, and unnecessary duplication. Using the results of this assessment, streamline and refocus the reporting of such information to governments and the public.
- Take immediate steps to reduce the level of provincial regulation of the planned Deep Panuke project. Such steps will include reducing the province's regulatory role in those areas adequately covered by joint or federal agencies.
- Sign a memorandum of understanding between the provincial Department of Environment and Labour and the Canadian Environmental Assessment Agency (CEAA) designed to minimize the level of overlap between the two environmental agencies in both the onshore and the offshore areas.
- Participate fully in the consultations to establish the rules under which the existing environmental approval processes and exploration activities will undergo transition to the CEAA process. The province will work with the CEAA to ensure that this transition does not impose unnecessary restrictions on the operators in the offshore area.
- Continue the ongoing process of direct consultation with the Province of Newfoundland and Labrador on finding solutions to common regulatory issues.
- With the federal government and the Province of Newfoundland and Labrador, develop new legislation and regulations on offshore health and safety.

2001-2005: Downstream

- Work with the Union of Nova Scotia Municipalities, municipalities, and the gas distributor(s) to develop a standard municipal operating agreement.

- Work with the local gas distributors to develop a series of standard practices for dealing with issues such as water crossings, sulphide-bearing materials (acid rock), vegetation clearance and disposal, protection of archaeological resources, etc.
- Rely primarily on market forces to establish the supply, demand, and pricing of gas and liquids in downstream markets.
- Implement the *Underground Hydrocarbon Storage Act* to provide a simplified and expedited approval process for the development of underground gas storage in Nova Scotia.

2001-2005: Government General

- Prepare a new Energy Act, which will consolidate sections from several existing pieces of legislation (e.g. *NSPI Privatization Act, Gas Distribution Act, Public Utilities Act*) into one act, including the establishment of timelines for regulatory review. This will clarify and simplify the legislation applicable to energy in Nova Scotia.
- Establish a Department of Energy to be responsible for provincial leadership on energy issues.
- Ensure that the Department of Energy and the UARB have sufficient resources to undertake their tasks.
- Provide the CNSOPB with the financial and human resources necessary to allow the Board to take a larger role in government regulation in the offshore, thus reducing the duplication of separate federal and provincial regulation.

Events that may lead to Strategy Adjustments

- Once the CNSOPB review of offshore regulation is complete, work with the federal government to implement the proposed changes.

Part III Electricity

Strategy Objectives

- To maintain continued access to secure, reliable, and affordable electricity produced in an environmentally responsible manner.
- To phase in competition in the Nova Scotia electrical industry.
- To create the regulatory and business environment that will encourage independent producers of wind energy and other renewable sources.
- To develop the policy framework that will encourage cogeneration opportunities, and to introduce competition for the construction of new generation capacity.
- To reduce the environmental impacts of electricity production, and to increase efficiency and demand management.

Actions to Achieve Objectives

2001– 2005

- Create an Electricity Marketplace Governance Committee (EMGC), accountable to the Minister of Energy, to facilitate the implementation, development, structure, and rules for introducing electricity competition. The EMGC will represent a wide range of stakeholder groups.
- Work with the Nova Scotia Utility and Review Board (UARB) and NSPI to introduce competition within the electrical sector in a staged and measured process beginning with supply to wholesale customers (currently six municipal utilities).
- Give policy direction for the UARB to authorize open access transmission on NSPI facilities for all generators selling to wholesale customers or export markets.
- Develop policies to introduce open competition for any new generation capacity approved by the UARB.
- Encourage cogeneration (combined heat and power plants) and permit an independent cogeneration sector in Nova Scotia to have access to NSPI's transmission system.
- Implement new renewable energy policies that allow independent power producers (IPPs) to have open access to NSPI's transmission system and, if the IPP chooses, to market green power directly to retail customers.
- Create a short-term voluntary renewable energy target for new IPPs totalling 2.5% of NSPI's generation capacity, or approximately 50 MW. The government and NSPI will monitor the voluntary process for three years and then establish a longer-term renewable energy portfolio standard (RPS) target.
- Implement information programs to promote efficient use of renewable energy technologies.

2006 and Beyond

- Determine the longer-term stages, if any, of increased competition.
- Determine the long-term RPS strategy.
- Continue to improve generation efficiency and reduce overall emissions in the electricity sector.

Part IV Renewable Energy Sources

Strategy Objectives

- To encourage the growth of a renewable energy industry in Nova Scotia.
- To increase renewable energy-based generation capacity and ensure open and fair access to the NSPI transmission system.
- To increase public awareness concerning the opportunities and benefits of using renewable energy sources.

Actions to Achieve Objectives

2001-2005

- Create an Electricity Marketplace Governance Committee (EMGC), accountable to the Energy Minister, to facilitate the implementation, development, structure and rules for introducing electricity competition. The EMGC will represent a wide range of stakeholder groups.
- Give policy direction for the UARB to authorize open access transmission on NSPI facilities for all generators selling to wholesale customers or into export markets.
- Implement new renewable energy policies that allow Nova Scotia-based independent power producers (IPP) to have open access to NSPI's transmission system, and if the IPP chooses, to market green power directly to retail customers.
- Create a short-term voluntary renewable energy target for new IPP's totalling 2.5% of NSPI's generation capacity, or approximately 50 MW. The government and NSPI will monitor the voluntary process for three years and then establish a longer-term renewable portfolio standard (RPS) target.
- Establish (through the UARB and NSPI) a green-power purchase rate structure for all NSPI rate classes. This rate will apply to sales by NSPI but not necessarily for IPP sales direct to customers.
- Participate in a green energy program, at premium pricing, for a percentage of the electricity used in provincial public buildings.
- Encourage municipalities and public sector agencies to set their own green power purchase targets for the voluntary period.
- Formalize NSPI's current policy of allowing net metering for renewable energy systems. Establish

through the UARB a specific category under NSPI's rates and regulations. The maximum capacity for systems to be eligible to participate will be recommended by the EMGC.

- Review the legislation under which rights to develop geothermal energy are presently issued to determine whether these can be dealt with more efficiently.
- Adopt standards that require all new wood burning appliances sold in Nova Scotia to meet minimum efficiency standards and Wood Energy Technical Training (WETT) installation certification.
- Implement information programs to promote efficient use of renewable energy technologies.

Part V Coal

Strategy Objectives

- To meet environmental air quality standards in economically efficient ways that minimize stranded costs.
- To support the development of indigenous coal sources for use in Nova Scotia where economically feasible and environmentally appropriate.
- To encourage land reclamation in present and former coal mining areas through reclamation mining, recovery of coal from previously disturbed mine sites, and restoration of the land following the removal of the coal.
- To support the development of clean coal technology to enhance opportunities for coal use while managing environmental impacts on the atmosphere.

Actions to Achieve Objectives

2001–2005

- Work with Nova Scotia Power Inc. (NSPI) on its plans to meet environmental targets and on establishing the role for indigenous coal in future electricity generation in Nova Scotia.
- Work within the national climate change process to ensure that Nova Scotia's interests with respect to coal-fired thermal electricity generation are taken into account.
- Maintain an up-to-date, publicly available inventory of the province's coal resources, including available information on coal quality and parameters affecting its use and environmental impacts.
- Inform the public, through a public awareness campaign, on the value of coal mining and the opportunities it presents for land reclamation in and around communities, and local economic development.
- Ensure the orderly surrender of the CBDC mining lease.
- Establish a development plan for surface coal in the Cape Breton coalfield and a process to licence or lease the coal resources to new private sector operators.

- Work with CBDC to establish a reclamation plan for CBDC lands with environmental liabilities.
- Work with NSPI and Nova Scotia universities to monitor the existing technology and new developments in clean coal technology, and opportunities for research and development in Nova Scotia.
- Provide research and development credits for clean coal technologies that address environmental issues.

2006–2010

- Monitor, research, and implement developments in clean coal technology.
- Monitor developments in alternate or unconventional means of coal utilization (e.g., in situ gasification).
- Encourage indigenous coal production, including reclamation mining in previously disturbed lands.

Part VI Environment

Section 1. Climate Change

Strategy Objectives

- To work with the federal and other provincial/territorial governments to implement the National Implementation Strategy (NIS) on climate change.
- To ensure that all Canadian jurisdictions equally share the burden of implementing any national response to climate change.
- To implement a long term strategy to reduce greenhouse gas (GHG) emissions in Nova Scotia.

Actions to Achieve Strategy Objectives

2001-2005

- Continue to participate in the national climate change process and contribute to the National Implementation Strategy (NIS).
- Continue to negotiate with federal and other provincial governments to ensure that impacts of national actions with respect to climate change are shared fairly by all jurisdictions.
- Launch a provincial program to reduce GHG emissions in government operations.
- Support the creation of public education programs on global climate change.
- Maintain a regulatory framework that encourages the use of clean fuels such as natural gas.

- Work with the Union of Nova Scotia Municipalities to promote greater awareness of the need to reduce GHG and adapt to climate change in key areas such as buildings, transportation and land-use planning.
- Promote the development of innovative technologies and practices to reduce GHG.
- Make climate change a part of government decision-making.
- Continue to work with government to establish a system that ensures credit to business and industry for early actions on climate change.
- Encourage climate change related research.

2006 and beyond

- Respond to national actions regarding reduction of GHG emissions.

Environment: Air Pollutants

Strategy Objectives

- Reduce the emission of air pollutants from the generation and consumption of energy in a manner that is consistent with national standards.

2001-2005

- Reduce SO_2 emissions by 25% from current levels by 2005.
- Reduce Mercury (Hg) emissions by 30% below 1995 levels by 2005.
- Negotiate agreements with the federal government and other provinces to establish a framework for co-operative and co-ordinated action. Work with existing facilities to model, and where appropriate, monitor the effects of their emissions to ensure that emission-reduction initiatives are having the desired results.
- Continue to require all utility and industrial boilers to install low-NO_x burner technology during upgrades and natural capital stock turnover.

2006 and Beyond

- Further reduce SO_2 in the longer-term to achieve a cumulative reduction goal of 50% by 2010.
- Reduce NO_x emissions by 20% below 2000 levels by 2009.
- Assess the state of technology options for mercury removal and introduce appropriate regulations for mercury emissions that comply with Canada-wide standards for mercury now under development, by 2010.

- Comply with Canada-wide Standards for Particulate Matter and Ozone by 2010.
- Continue to require all utility and industrial boilers install low-NO_x burner technology during upgrades and natural capital stock turnover.

Part VII Energy Efficiency

Section 1. Conservation and Efficiency

Strategy Objectives

- To provide mechanisms to encourage the conservation and more efficient use of Nova Scotia's energy resources.
- To increase public awareness of the importance and benefits of energy conservation and efficient energy use.

Actions to Achieve Strategy Objectives

2001–2005

- Lead by example with a government house-in-order program that has targets for energy use in existing government-funded facilities.
- Promote the use of energy service companies (ESCOs) as a means of achieving energy savings by large energy users, including government.
- Develop and maintain an inventory of energy use for all provincially owned or funded facilities and all fuel used in the provincial vehicle fleet.
- Continue to support energy efficiency in new housing, including the R-2000 Home Program and ENERhouse conference.
- Encourage energy efficiency in existing housing by supporting residential energy audits, expanded web-based energy information, publications, and advice to consumers.
- Work with the federal government and other partners to provide energy efficiency audits, information, and incentives to industry and small-to-medium sized businesses.
- Increase participation in the Voluntary Challenge and Registry through dissemination of information and assisting industry with requirements for participation.
- Require that all new government-funded buildings exceed the targets of the model National Energy Code for Buildings by 25%, so that facilities may qualify for the Commercial Building Incentive Program (CBIP).
- Begin to phase in energy efficiency standards for commercial heating, ventilating, and air

conditioning equipment in provincially funded buildings.

2006 and beyond

- Continue implementation of government house-in-order programs and review and report on progress. Determine potential for expansion of the program beyond energy to include green buildings standards.
- Revisit energy standards (codes) and update as required in response to changes in energy prices, and in the cost of energy efficiency measures and technologies in new housing and buildings.
- Review industry action to improve energy efficiency and reduce greenhouse gas emissions through Voluntary Challenge and Registry and other benchmarks, and revise voluntary initiatives as appropriate.
- Consider expansion of government house-in-order program to facilities rented by government.
- Update energy efficiency standards for energy-using equipment.
- Encourage and support municipalities in their efforts to implement energy efficiency initiatives that address municipal energy use.
- Review progress by small and medium enterprises in implementing energy efficiency measures, and adjust services and programs as required.
- Update appliance and efficiency standards.

Part VII Energy Efficiency

Section 2. Transportation

Strategy Objectives

- To increase energy efficiency in the Nova Scotia transportation sector and improve air quality by decreasing harmful air emissions.
- To raise public awareness of the importance of energy efficiency in the transportation sector .

Actions to Achieve Objectives

2001–2005

- Maintain existing partnerships and develop new partnerships, particularly in the context of existing federal, provincial, and municipal policies and programs, to encourage energy efficiency in the transportation sector.
- Develop pilot projects in conjunction with non-profit agencies, the private sector, and municipalities

to encourage more efficient transportation systems within their jurisdictions.

- Support initiatives in the multi-modal transportation strategy The Way Ahead, that encourage energy efficient transportation modes.
- Participate with the federal government and other provincial governments in joint programs aimed at improving energy efficiency in the transportation sector.
- Ensure that regulations and policies developed and implemented by the province recognize and reflect the need for energy efficiency in the transportation sector.
- Develop a provincial transportation statement of interest for inclusion in the Municipal Act, that provides for the incorporation of transportation efficiency in land-use planning. Work with municipalities to coordinate provincial transportation infrastructure decisions with municipal plans.
- Provide public awareness and education on the importance of energy conservation and emission reductions in the transportation sector.

Factor for a Change in Policy or Tactics

- When new technologies emerge that offer economic and energy efficient modes of transportation, the province will take a leadership role in considering early adoption of such technologies.

Part VIII Aboriginals and the Energy Sector

Strategy Objectives

- To increase economic opportunities in the energy sector for Nova Scotia Mi'kmaq employment and/or joint venture opportunities.
- To protect Mi'kmaq historical and cultural artifacts during energy developments.
- To ease uncertainty with respect to treaty and related issues through negotiated solutions.
- To hold appropriate and timely consultation between the Governments and Nova Scotia Mi'kmaq on matters that infringe treaty rights.

Actions to Achieve Strategy Objectives

2001-2005

- Provide opportunities for the views and interests of all stakeholders, including those involved in the energy sector, to be taken into account during the process of addressing treaty rights and related issues with Nova Scotia Mi'kmaq.
- Work with Mi'kmaq organizations and the private sector to identify appropriate opportunities for greater Mi'kmaq participation in the energy sector.

- Work collaboratively with the Nova Scotia Mi'kmaq and the Government of Canada in ensuring that appropriate training and education opportunities are available to enable Mi'kmaq to take advantage of employment and business opportunities in the energy sector.
- Ensure that appropriate steps are taken to protect cultural artifacts and items of historical importance during energy development.

Part IX Research and Development

Strategy Objectives

- To enhance the province's research base so that it has the capacity to support Nova Scotia's emerging oil and gas sector, develop new approaches to its traditional coal sector, and guide it through the eventual transition to an energy economy based on renewable resources.
- To create university/college–private sector–government partnerships that will strengthen energy-sector research and development, and help multiply provincial funding with private and federal research money.
- To create a culture shift in Nova Scotia toward a knowledge and innovation-based economy through enhanced research and development in energy.

Actions to Achieve Objectives

- Develop and host a major energy research forum as a follow-up to the 2001 Nova Scotia energy forum Open to the World. This is to showcase Nova Scotia's research capacity and to help match that capacity with interested private sector partners in particular priorities: deepwater technologies and operations, clean coal technology, energy conservation and efficiency, renewable energy research and development, and impacts of the hydrocarbon industry on the marine fishery and environment.
- Initiate the first phase of a three-phase Nova Scotia Public Energy Research Strategy, with the aim of encouraging a shift in research capacity toward the energy sector.
- Develop incentives to encourage offshore energy producers to use revenues from development of non-renewable energy resources to further research in renewable energy sources.
- Secure commitments, whenever possible, from potential hydrocarbon developers for research and development initiatives or possible partnerships with researchers as part of the offshore strategic energy agreement (OSEA) approach to developing our offshore resources.
- Establish a Research and Development branch within the Department of Energy to focus government leadership and coordinate provincial efforts.
- Work with the fishing industry, DFO, and ACPI to bring research initiative to bear on potential

conflicts that might arise from multiple uses of environmentally important areas.

- Prepare the way at the outset for the transition, at the end of five years, to Phase 2 of the Nova Scotia Public Energy Research Strategy. This transition will build on the research base established during the contract activities encouraged in Phase I and will address the creation of public-private consortia that will focus on important commercial opportunities.
- Encourage commercial development of proprietary inventions through the creation of joint ventures or start-up companies, thereby leading to the full development of Phase III activities.

Part X Energy Fiscal and Taxation Policy

Strategy Objectives

- To develop a business and social environment in Nova Scotia that is able to compete in the global energy industry.
- To use direct oil and gas revenues to permanently transform the province's economy and improve its fiscal position.

Actions to Achieve Objectives

2001–2005

- Continue to practise strong fiscal management in an open, conservative, and responsible manner.
- Maintain government's understanding of the fairness and competitiveness of the province's fiscal regimes.
- Institute a rigorous process of continuous self-assessment through competitive surveillance and benchmarking. Share this knowledge with the public and industry and use it for strategic advantage.
- Bundle existing and future business incentives into a Nova Scotia Energy Industry Growth Program, and develop a communication and marketing plan to introduce this program aggressively to energy-related businesses on a global scale. Develop as a first step the business case for R&D incentives in such energy-related fields as renewable energy, energy conservation, and clean coal technology.
- Coordinate all provincial government fiscal and taxation policies and practices so that an effective and consistent financial plan is communicated to government employees, the business sector, and the public.
- Develop a long-term financial and taxation plan to manage the expected revenues from a growing non-renewable energy industry. Establish a clear and measurable economic criteria and accountability framework to govern the use of such revenues.

- Release a range of royalty estimates founded on prudence and conservatism. This will underscore the sensitivity of royalty revenue forecasts to such potentially volatile variables as commodity prices and production rates.
- Work with the Government of Newfoundland and Labrador and other provincial and territorial governments to create and negotiate a fiscal regime for natural resources with the Government of Canada that is fair and fulfills the principle that provinces should be the primary beneficiaries of those resources. The Government of Nova Scotia will continue its Campaign for Fairness, and will expand its invitation to the energy industry to support the campaign.

Factors Leading to a Change in Strategy Direction

- Once offshore royalties become "net incremental revenues," the province will establish a Nova Scotia Offshore Heritage Trust to receive and manage a portion of the net royalties from offshore oil and gas for the benefit of future generations.

Part XII

Glossary of Terms

Seizing the
Opportunity
Volume 2

Nova Scotia's Energy Strategy

NOVA SCOTIA

Energy Sector Glossary of Terms

Acid rain	Precipitation containing nitric or sulphuric acids formed primarily by nitrogen oxides and sulphur dioxides released into the atmosphere when fossil fuels are burned. It can be wet precipitation (rain, snow, or fog) or dry precipitation (absorbed gaseous and particulate matter, aerosol particles, or dust). Also called acid precipitation or acid deposition
Airshed	A region within the sphere of influence of the same sources of air pollution, which shares essentially the same meteorology and air quality.
Anaerobic	In the absence of oxygen.
Anchor load	Large commercial or industrial energy end-users whose consumption forms the initial load required to build or expand the natural gas delivery system.
Anthropogenic	Originating from human activities; man-made.
Bcf (billion cubic feet)	A measurement of volume for natural gas.
Biomass	Energy resources derived from organic matter, including wood, agricultural waste, and other living-cell material that can be burned to produce heat energy; also includes algae, sewage, and other organic substances that can

	be used to make energy through chemical processes.
Btu (British thermal unit)	A unit of measurement for energy; the amount of heat necessary to raise the temperature of one pound of water by one degree Fahrenheit. 1 Btu = 1.054 kJ.
Bundled, bundling	The combination of two or more services that could be provided separately (for example, the sale of a unit of natural gas and the transportation of the gas to the customer) into a single service (such as delivered gas service traditionally offered to residential and small commercial gas consumers).
Bypass	A direct connection by an energy end-user to the main transmission pipeline, or a lateral thereof, without accessing a local delivery system.
Capacity	The maximum power that a generating unit, generation station, or other electrical apparatus can supply, usually expressed in megawatts (MW). The maximum volume of natural gas that can flow through a pipe.
Carbon dioxide	A greenhouse gas; chemical formula CO_2, formed by the combustion of carbon and carbon compounds.
City gate	The delivery point or the point of interconnection between long-distance

	transmission pipelines (usually interprovincial or interstate) and local distribution systems.
Clean coal technologies	Technologies designed to enhance both the efficiency and environmental acceptability of coal extraction, preparation, and use.
Coalbed methane:	Natural gas (principally methane) contained in coal seams.
Co-firing:	The process of burning natural gas in conjunction with another fuel.
Cogeneration	The simultaneous production of electricity and steam from one energy source.
Coke	A combustible material (fuel) consisting of mineral matter and carbon fused together, derived by heating coal or heavy oil to drive off the volatile matter; used in some Nova Scotia electricity generating plants.
Combined-cycle plant	An electricity generating station that uses waste heat from its gas turbines to produce steam for conventional steam turbines.
Condensate	The liquid resulting when a vapour iis subjected to cooling or application of pressure. ; also lLiquid hydrocarbons condensed from gas and oil wells.
Cost of service	A term used in public utility regulation to mean the total amount of revenue required to cover the costs of an electrical utility or **LDC**.

	Costs can include operation and maintenance expenses, other necessary costs (such as income taxes, depreciation, depletion, and amortization of the property not covered by ordinary maintenance), and a fair return on capital and owners' equity to ensure that the electric utility LDC maintains financial integrity, attracts new capital, and compensates the owners for the risks involved.A traditional rate making methodology for public utilities (natural gas and electricity) that establishes rates which cover the cost of providing the service (capital and operations) plus a reasonable return on investment.
Crown land	Land owned by the federal or provincial governments in Canada.
Cumulative effects	The combined effects of a number of stressors acting over time.
Deepwater	Water depths in excess of 1,000 feet, or 300 metres.
Demand-side management (DSM)	The planning, implementation, and monitoring of utility activities designed to encourage consumers to modify patterns of electricity usage, including the timing and level of electricity demand; refers only to energy and load-shape modifying activities undertaken in response to utility-administered programs, not to energy and load-shape changes arising from

	the normal operation of the marketplace or from government-mandated energy efficiency standards.
Development well	A well drilled for natural gas (or crude oil) within a proven field or area for the purpose of completing the desired pattern for production.
Discovery well	An exploratory well that encounters a previously untapped oil or natural gas deposit.
Distribution tariff	The charge the customer pays for the local transportation (natural gas) provided by the local distribution company (**LDC**) or electricity distribution service (electric) by the electric utility.
Distributor	A company that controls the gas between the city gate and the end-user's meter; frequently referred to as a local distribution company (**LDC**).
Dry gas	Raw natural gas with a relatively low concentration of **natural gas liquids**.
Dry hole	A well that does not yield sufficient volumes of gas or oil to support commercial production.
Ecosystem	A system formed by the interaction of organisms (including humans) with their physical environment.
Electrostatic precipitator	A technology used to remove particulate matter from the emission stream before it

	leaves a smokestack.
End-user	A person or company that consumes an energy commodity (not one that sells or resells an energy commodity, or processes it into another energy form); for example, the electricity consumer is the end-user, not the power plant that converts fuel to electricity.
End-use energy demand	The energy used by final customers. It excludes energy losses during conversion from one form to another, and transmission losses.
Exploratory well	A well in an area where petroleum has not been previously found, or a well targeting formations above or below known reservoirs.
Fossil fuel	Remains of organisms embedded in the earth's crust, with high carbon and/or hydrogen content and used as a source of energy.
Fractionation plant	A plant that separates, or fractionates, a combined stream of hydrocarbons (gases and liquids) into its various components, usingthrough a series of densityboiling points, separations using heat, and some pressure.
Gas distribution system	The distribution and service lines, and their associated control devices, through which gas is conveyed from transmission lines, or local sources of supply, to a customer's meter.
Gas reservoir	A rock stratum that forms a trap for the accumulation of natural gas.

Geophysical survey	A process of searching and mapping the subsurface structure of the earth's crust using geophysical methods (e.g., **seismic**) to locate probable reservoir structures capable of producing commercial quantities of natural gas or crude oil.
Geoscience	Any activity that requires the application of the principles of the geological sciences.
GHG	Greenhouse gas (typically, CO_2, NO_x, methane, chlorofluorocarbons, or ozone).
Green power	Electricity deemed to be generated in an environmentally less intrusive manner than most traditional generation, usually in accordance with standards established by government or regulatory agencies; sources include wind, water, landfill gas, and solar.
Green power marketing	The commercial process of marketing and selling the output of certain generation sources identified as "green" because they meet certain standards for being deemed environmentally preferable.
Greenhouse effect	The increasing mean global surface temperature of the earth caused by gases (**GHGs**) in the atmosphere that allow solar radiation to penetrate, but absorb the infrared radiation returning to space.
Hydrocarbon	Any one of hundreds of organic compounds

	(gas, liquid, or solid) containing only hydrogen and carbon.
Independent power producer (IPP)	Any entity that owns or operates an electricity generating facility that is not included in an electric utility's rate base; includes, but is not limited to, cogenerators, small power producers, and all other non-utility electricity producers, such as exempt wholesale generators that sell electricity.
Interconnected system	Two or more individual transmission systems that have one or more interconnecting tie lines.
Interruptible load	Energy or power made available under an agreement that permits curtailment or interruption of delivery at the option of the supplier.
Interruptible service	The element of a contract that allows a distributing party to temporarily suspend delivery of gas or electricity to a buyer in order to meet the demands of customers who purchased *firm service*; generally less expensive than firm service; used by customers who can either accommodate interruption or switch temporarily to alternative fuels.
Kilowatt-hour (kWh)	A standard unit for measuring a quantity of electrical energy; customer rates are usually expressed in cents per kilowatt-hour.
kWh metering	A method of measuring the total usage of

	electrical energy on a continuing basis; not capable of recording and tracking usage over shorter intervals, such as hourly.
LDC (local distribution company)	Aan entity that owns a distribution system for the local delivery of energy (gas or electricity) to consumers.
Light-handed regulation	A streamlined regulatory method designed to speed up the process and reduce the cost of regulation while balancing the interests of the various parties and allowing the regulator to carry out its statutory duties.
Load	The amount of electric power or natural gas volume delivered or required at any specific point or points on a system. The requirement originates at the energy-using equipment of the consumer.
Marginal energy cost	The sum that has to be paid for the next increment of product or service; for example, the marginal cost of electricity is the price to be paid for each kilowatt-hour above and beyond the power supplied by currently operating generation capacity.
Marine protected area	A distinct component and management tool of an integrated ocean management plan under the Oceans Act; identifies a area for priority attention because of ecological sensitivity, identifies human priorities in that area, and tries to establish boundaries.

Mcf (thousand cubic feet)	A unit of volume most commonly used in the low-volume sectors of the natural gas industry (such as residential distribution).
Megawatt (MW)	Unit of electrical power commonly used to measure the capacity of a generating station or the maximum demand of a large electricity consumer.
Megawatt-hour (MWh)	A measure of the energy produced by a generating station over time; 1 MW of power produced for 24 hours provides 24 MWh of energy (as does 24 MW produced for one hour).
Merchant generation	As used in NERC reference documents and reports, aAny entity that owns or operates an electricity generating facility that is not included in an electric utility's rate base; includes, but is not limited to, cogenerators and small power producers and all other non-utility electricity producers, such as exempt wholesale generators who sell electricity.
Meter	Equipment that measures and registers the amount and direction of energy quantities over a period of time.
Metering	The process of measuring quantities of energy.
Methane	The principal constituent of natural gas; the simplest hydrocarbon molecule, containing one carbon atom and four hydrogen atoms;

	chemical formula, NH_4.
MMcf (million cubic feet)	Unit of measure for volume of natural gas.
National Energy Board (NEB)	The federal regulatory agency in Canada that authorizes oil, natural gas, and electricity exports; certifies interprovincial and international pipelines and designated interprovincial and international power lines; and sets tolls and tariffs for oil and gas pipelines under federal jurisdiction.
Natural gas liquids	Liquids obtained during natural gas production;, includesing ethane, propane, butanes, and condensate.
Net metering	Allows the electric meters of customers with generating facilities to run backwards when their generators are producing more energy than they demand themselves; allows customers to use their generation to offset their consumption over a specified periodiod, not just instantaneously.
Nitrogen oxides	Air contaminants that contribute to acid rain; molecules consist of nitrogen and oxygen atoms; chemical formula, NO_x.
Non-attributable damage	Damage which cannot be traced back to a particular source.
Off-peak period	The period of time during a day, week, month, or year when gas or electricity use on a particular system is not nearat its maximum.

Ozone	A gas (O_3) that in the upper atmosphere (the ozone layer) protects us from harmful ultraviolet rays, but in the lower atmosphere (ground-level ozone) can cause respiratory problems as well as other environmental damage; chemical formula 0_3.
Particulate matter (PM)	Unburned fuel particles that form smoke or soot (very fine particulates stick to lung tissues when inhaled); a chief component of exhaust emissions from heavy-duty diesel engines.
Peak-use period	The period of time when gas or electricity use on a particular system is at its maximum and when supply is most likely to be suspended for interruptible service customers. Distributors also employ techniques such as peak shaving to soften the impacts of high demand on pipelines or electricity transmission/generation.
Peaking capacity	Generating capacity typically used only to meet the peak demand (highest demand) for electricity during the day; typically provided by hydroelectric generators or combustion turbine generators (fueled by natural gas or fuel oil).
Performance-based regulation (PBR)	Any rate-setting mechanism that allows a utility's cost savings, incremental revenues, or other benefits to be shared between the owner of a utility (natural gas or electricity) and its customers. Returns are based on performance measured against specific criteria set by the

	regulatorattempts to link rewards (usually profits) and penalties to desired results or targets.
Petajoule	A unit of energy; 10^{15} joules (one joule (J) is the unit of electrical energy required to maintain a current of one amp for one second against a resistance of one ohm; 1 **Btu** = 1054.8 J).
Petrochemical feedstock	Input material (methane or ethane, for example) from which petrochemicals are manufactured.
Petroleum	A naturally occurring mixture of hydrocarbons in gaseous, liquid, or solid form.
Petroleum rights issuance	The process by which access to petroleum **rights** is granted, following a pre-established process of steps and associated timelines; the approach is the same in both the offshore and the onshore, although the processes and the timelines are slightly different.
Photovoltaic	A means of converting solar energy into electrical energy (typically by way of. photovoltiac cells, or panels comprising a number of cells).
Postage stamp rate	A transmission rate applied to a particular area that does not vary by the distance between the receiving and the delivery points; for example, the Maritimes & Northeast Pipeline will have a

	postage stamp rate in Nova Scotia because the transmission rates will be the same for gas delivered by the pipeline to any location in Nova Scotia served by the mainline or any of the laterals.
Potential resources	The volume of natural gas or oil thought to exist based on geological knowledge but not proven to exist through drilling.
Projected marginal energy cost	The projected sum that has to be paid for the next increment of product or service; for example, the marginal cost of electricity is the price to be paid for each kilowatt-hour above and beyond the power supplied by currently operating generation capacity.
Primary energy demand	The total amount of energy used for all reasons. It includes energy that is: used by the final consumer, transformed from one form to another (i.e. coal to electricity), and used during transportation of energy to markets (i.e. transmission losses).
Rate of return (ROR)	A percentage generally derived from the (defined) net operating income divided by the rate base; may refer to actual return to a utility company or a permitted return (generally based on the cost of capital determination) or actually earned by a utility company.
Reclamation mining	Any mining operation subsequent to the original mining or site abandonment that

	results in reclamation of lands disturbed by the previous mining activity.
Regulation	The oversight of a market by an administrative agency (**regulator**)or **regulator**, including any intervention in the market to set rates and other terms and conditions under which a regulated service must be provided; traditional regulation attempts to put a monopoly under restraints to achieve prices (rates), output, and investment levels comparable to those that occur in a competitive market.
Regulator	An entity that, through power of law or some other legitimate means, has the authority to impose regulation.
Renewable energy sources	Energy sources that are renewed by natural processes including wind, biomass, solar, geothermal, run of the river micro-hydro, and tidal.
Reserves	QuantityVolumes of hydrocarbons, coal, or minerals considered to be economically recoverable using current technology.
Retail market or retail access	A market in which electricity and other energy commodities or services are sold directly to consumers by competing suppliers.
Royalty	The amount paid to the Crown by the owner of a petroleum or mineral right as payment for the petroleum or minerals removed. In natural gas

	or oil production, the royalty is usually based on a percentage of the total production. In Nova Scotia, coal royalty is typically based on a fixed charge per **tonne**.
Seismic	Pertaining to or characteristic of sound waves in the earth; used in the oil and gas and coal industryies via seismic surveys to determine underground rock structure. S (sound waves produced by small controlled explosions are focused into the ground, and the reflections from various layers in the earth are recorded; – the sound waves travel at different speeds in rock layers having different densities, thereby allowing determination of structure based on the makeup of rock types).
Sequestration	In the context of climate change, the long-term storage of carbon in biological sinks (forests, agricultural soils, wetlands, etc.) or geological formations (underground reservoirs such as those in which natural gas and oil are found).
Sorbent	Material that has the capability of absorbing another substance.
Storage facilities	Facilities used for storing natural gas; gaseous storage facilities are usually salt caverns or depleted natural gas or crude oil reservoirs; liquified natural gas (LNG) storage facilities are high-pressure vessels.
Stranded costs/investment	Costs of a utility that cannot be recovered from

	market prices (for example, an electrical utility's assets that would become uneconomic in a competitive market).
Sulphur dioxide	Air contaminant that contributes to acid rain formed by the combustion of sulfur in fuels; chemical formula, SO_2.
System operator	The entity with the responsibility to monitor and control an electricity system in real time.
Tariff	The terms and conditions under which a service or product will be provided, including the rates or charges that users or consumers must pay; usually proposed by the service or commodity provider, and subject to regulatory approval (typically, the rates and terms for obtaining transmission or distribution service are set forth in a tariff).
Tcf (trillion cubic feet)	A volume measurement for natural gas.
Thermal plant	A power plant that produces heat before changing it to electricity, typically by burning fuel to produce steam, which runs an electrical turbine generator producing electricity.
Tonne	Metric unit of masston; 1,000 kilograms, or 2, 205 pounds.
Transmission	The movement or transfer of electricity energy or natural gas over an interconnected group of lines and associated equipment between points of supply and points at which it is transformed

	for delivery to consumers, or is delivered to other, separate electric/gas transmission systems. Transmission is considered to end when the energy is transformed for distribution to the consumer.
Transmission system	Pipelines or wires that transport energy over long distances, usually from supply to market regions or to other transmission systems. A (a gas transmission system usually has a linear configuration, large-diameter pipe, and operates at high pressures; an electricity transmission system usually operates at high voltage).
Unbundling, unbundled services	Terms used to describe operational and pricing models in which the sale of natural gas or electricity commodity is separate from the distribution transmission service.each service (transmission, storage, marketing of commodity, and delivery of natural gas; generation, transmission, and distribution/marketing for electricity) is individually operated and priced; transmission in an unbundled environment is "open access" for all shippers in both gas and electricity.
Underground gas storage	The use of subsurface facilities (usually geological reservoirs, such as depleted oil or gas fields or caverns within thick salt formations) for storing natural gas for the primary purpose of load balancing.

Upstream	Facilities or operations performed before those at the point of reference. Gas production is upstream of pipeline transportation.
Utility and Review Board (UARB)	The regulatory agency in Nova Scotia that oversees gas distribution, gas marketing, and the electricity industry.
Wet gas	Raw natural gas with relatively high concentrations of **natural gas liquids**.
Wet scrubber	A technology that removes sulphur dioxide from an emissions stream before it leaves a smokestack.
Wheeling	The use of an interconnected transmission system to implement transactionsallow independent parties that to transmit electricity into (wheeling in), within, out of (wheeling out) or through (wheeling through) that system.
Wholesale market	The market in which electricity and other energy services are sold to wholesalers, retailers, and distributors, who in turn sell to retail or end-use customers, and who (in the case of electricity) would have the option to buy power from a variety of generators or suppliers, who in turn would be able to compete to sell their power to a variety of wholesalers, retailers, and distributors.

Abbreviations

CanWEA	Canadian Wind Energy Association
CAPP	Canadian Association of Petroleum Producers
CBDC	Cape Breton Development Corporation
CBM	coalbed methane
CBRM	Cape Breton Regional Municipality
CCME	Canadian Council of Ministers of the Environment
CEAA	Canadian Environmental Assessment Act
CNSOPB	Canada–Nova Scotia Offshore Petroleum Board
CO_2	carbon dioxide
CSA	Canadian Standards Association
DEL	Department of Environment and Labour (Nova Scotia)
DFO	Department of Fisheries and Oceans (Canada)
DNR	Department of Natural Resources (Nova Scotia)
DOE	Department of Environment (U.S.)
DSM	demand-side management
ECTO	East Coast Transmission Organization
EMGC	Electricity Marketplace Governance Committee
EPA	Environmental Protection Agency (U.S.)
EPCM	engineering, procurement, and construction management
ESCO	Energy Service Company
ESRF	Environmental Studies Research Fund
FEAC	Fishing and Environmental Advisory Committee (CNSOPB)
FEED	front-end engineering and design
FERC	Federal Energy Regulatory Commission (U.S.)
FPTA	Federal-Provincial/Territorial-Aboriginal (Forum)
GPS	global positioning system
HFO	heavy fuel oil
Hg	mercury
HRM	Halifax Regional Municipality

ICT	Industrial Control Technician/Instrumentation
ICGCC	integrated coal gasification combined cycle
IPCC	Intergovernmental Panel on Climate Change
IPP	independent power producer
ITS	intelligent transportation systems
kWKWh	kilowatt-hour
lb/MMBtu	pounds per million British thermal units
LTTD	low temperature thermal description
M&NP	Maritimes and Northeast Pipeline
MOU	memorandum of understanding
MW	megawatt
NAICC-CC	National Air Issues Coordinating Committee on Climate Change (Canadian)
NEB	National Energy Board
NIS	National Implementation Strategy (Climate Change)
NGL	natural gas liquid
NO_x	nitrogen oxides
NSPD	Nova Scotia Petroleum Directorate
NSPI	Nova Scotia Power Incorporated
OTANS	Onshore/Offshore Technologies Association of Nova Scotia
PFLG	Petroleum Fisheries Liaison Group (CAPP)
PM	particulate matter
PPA	power purchase agreement
R&D	research and development
RAP	Regional Advisory Process (DFO)
RPS	renewable portfolio standard
RTO	regional transmission organization
SBC	system benefits charge
SCR	selective catalytic reduction
SO_2	sulphur dioxide
SOEI	Sable Offshore Energy Inc.

SOEP	Sable Offshore Energy Project
T&PW	Transportation and Public Works (Nova Scotia)
UARB	Utility and Review Board (Nova Scotia)
UN-ECE	United Nations Economic Commission for Europe
UNFCC	United Nations Framework Convention on Climate Change
VOC	volatile organic compound
WETT	Wood Energy Technical Training